MARCH 1943

MAR 20 1943

ENGINEERING
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MAINTENANCE
OPERATION

Public Works

LOBAL WATER PROTECTION FOR
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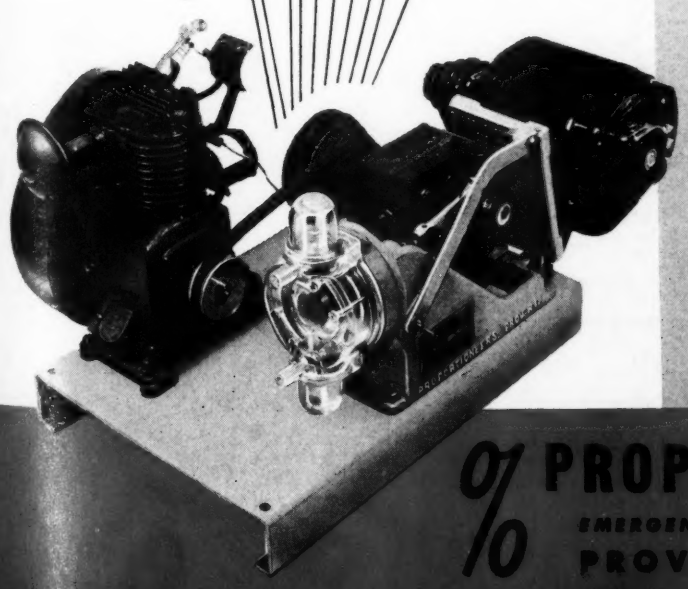

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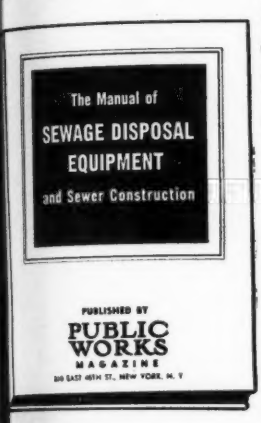

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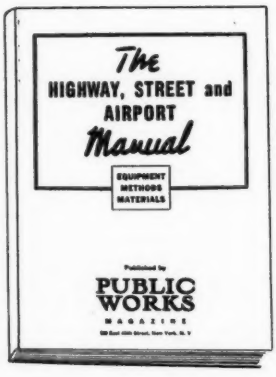

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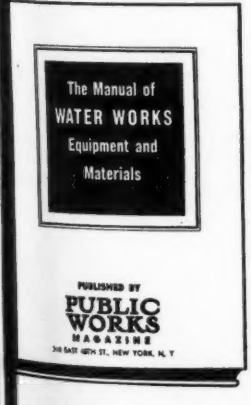

few copies of the 1942 edition of these luable Manuals are left. If copies are t in your office write today for formation on how to obtain them.

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Founded in 1896

Devoted to the interests of the engineers and technical officials of cities, counties and states

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A. PRESCOTT FOLWELL, Editor

MARCH CONTENTS

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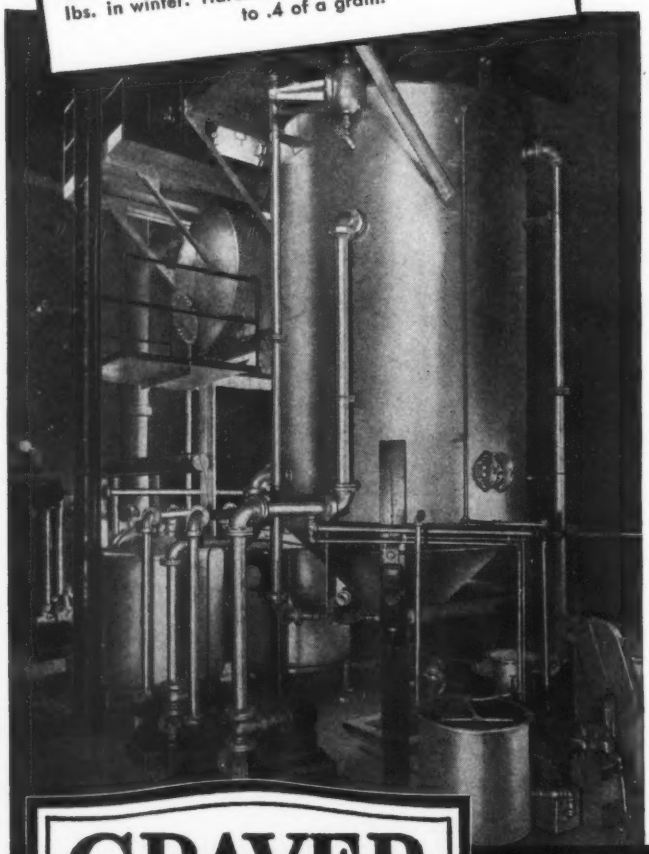
No trace of scale or corrosion after *14 MONTHS USE!*

A Graver Hot Process Water Softener installed in a Minnesota Municipal Water and Light Plant softens boiler feed water for 1 Riley and 3 Kidwell 250 H. P. water tube boilers. Operating at 400 lbs. pressure they generate 300,000 lbs. of steam in summer and 500,000 lbs. in winter. Hardness of 11 to 22 grains is reduced to .4 of a grain.



UP IN MINNESOTA, a Municipal Water and Light Plant* installed a Graver Hot Process Water Softener to treat their boiler feed-water. Their boilers supply steam to drive the turbines which generate power for the city lights and steam to heat the business district of the town. And they are the source of power for the pumps which supply the city water.

The exacting demands on this boiler plant are continuous. Nevertheless, a thorough examination of the boilers after 14 months of use revealed that there was *no trace of scale or corrosion in the system.*

Briefly, Here Are The Facts

- Water supply tests 11 grains hardness in Summer and 22 grains in Winter.
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- There is no trace of scale or corrosion.
- Water treating costs materially reduced.

This is just another example of the efficiency and economy of the Graver Hot Process Water Softener, and it is typical of the service this equipment is delivering in hundreds of plants all over the country.

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Our new bulletin, No. 314, gives complete details about Graver Hot Process Water Softeners and includes flow charts, tables, and other valuable data. Write for your copy today.

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GRAVER HOT PROCESS WATER SOFTENERS

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THE WAR EMERGENCY

WPB Proposes State Equipment Pools for Road Maintenance

The War Production Board announced February 27th a plan now being formulated whereby all state and local governments will be assured of adequate equipment to maintain streets and highways for the duration. The plan is a voluntary equipment pooling arrangement, such as has been in operation this winter in several areas for snow removal. All types of equipment for road construction and maintenance and snow removal in a given state would be pooled and the pool handled by a state official, who would dispatch necessary equipment where needed. Where state laws prohibit pooling, governors may exercise war emergency powers.

Concrete Mixers and Contractors Pumps Simplified

Effective March 15 the WPB has imposed simplification measures on the manufacture of portable construction concrete mixers, truck mixer-agitators, and contractors' dewatering and supply pumps. According to WPB this move will effect an over-all 74 per cent reduction in the number of models and sizes hitherto manufactured, and is estimated to increase production, bring about some saving in critical materials, and liquidate approximately 4,350 tons of slow-moving inventory.

This order, L-217, limits the manufacture of this equipment to specified sizes, types and models; portable construction concrete mixers are limited to three sizes; truck mixer-agitators to two models and two sizes of each; dewatering and supply pumps to ten types.

Simplification of Controlled Materials Plan Procedures

CMP Regulation No. 7, to be issued early in March, will provide a single standard form of certification which may be placed on any delivery order, although the forms now required by Regulations 3, 4 and 5 may still be used if the purchaser chooses.

CMP Regulation No. 7 will provide that any delivery order under the Controlled Materials Plan may be validated by endorsing it or accompanying the order with a certificate, in substantially the following form, signed manually or with a facsimile signature as provided in Priorities Regulation No. 7:

"The undersigned purchaser certifies, subject to the penalties of Section 35 (A) of the United States Criminal Code, to the seller and to the War Production Board, that, to the best of his knowledge and belief, the undersigned is authorized under applicable War Production Board regulations or orders to place this delivery order, to receive the item(s) ordered for the purpose for which ordered, and to use any preference rating or allotment number or symbol which the undersigned has placed on this order."

If an applicable CMP regulation requires that an allotment number or symbol, preference rating or other identification be included in a certification, it must be placed on the delivery order if the form above is used.

Use of this standard form by those who wish to take advantage of it will obviate the necessity, which will otherwise arise in many cases, of placing several different certifications on a single order.

New Form for "Application for Preference Rating"

WPB announced February 27 that a revision of Form PD-1A had been made, based on suggestions from industry representatives, and copies are now available. Applications filed on the old form will be processed until April, after which only the revised form will be accepted. All PD-1A applications must be filed with the nearest WPB District Office, not in Washington.

After March 15, all applications for ratings on less than $100 worth of material will be processed in the War Production Board Regional Offices. This preliminary value limitation will be progressively stepped up as the field offices assume greater responsibilities. It is expected that within six weeks more than eighty per cent of all PD-1A applications will be handled entirely in the field.

The First CMP Order for Water and Other Utilities

The Office of War Utilities, recently created within the War Production Board to administer war activities of electric, gas, water, steam, and communications utilities, issued its first basic order on February 24.

The order, U-1, replaces the former P-46 and all amendments and supplements thereto, reenacting most of the P-46 provisions. It governs the flow of materials into the entire utilities field with the exception of communications, and is the first industry order to be integrated with the Controlled Materials Plan.

An important group of provisions within the order, designed to effect sharing of material and equipment in utility inventories, requires utilities to sell surplus stocks as a condition for continuing to receive priorities assistance. These provisions are linked with the creation of regional surplus stock offices, to be in operation throughout the United States in March, through which utilities will carry on the redistribution of their surplus materials and equipment.

The order authorizes the use of a higher rating, AA-1, and a Controlled Materials Plan allotment symbol, to permit Utilities to obtain materials for maintenance, repair and minor construction. The order also, for the first time, brings under inventory regulation stocks of controlled material held by utilities for use in construction. It requires utilities to limit such holdings to their needs for the ensuing sixty days.

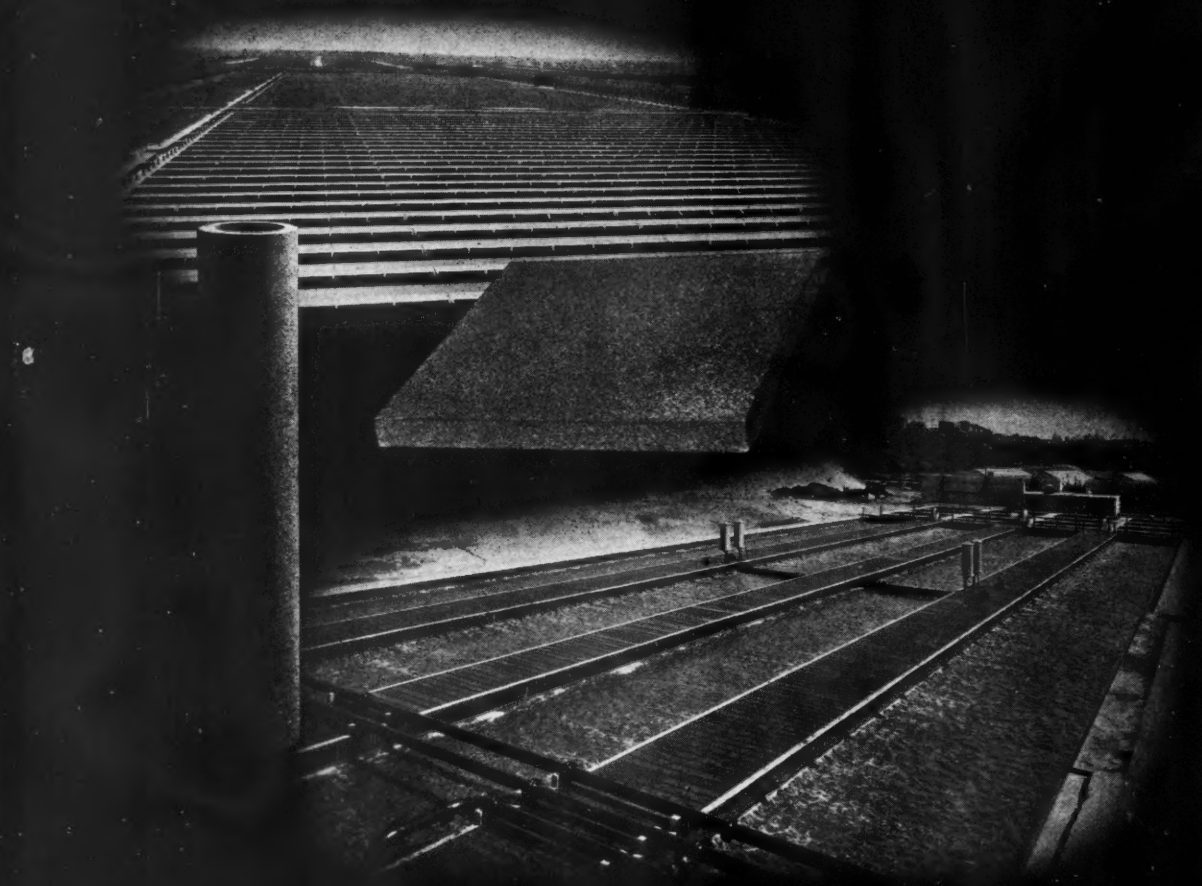
A sharp reduction in the inventory which may be held for maintenance and repair after March 31, 1943, is made in the new order.

(Continued on page 32)

IN LARGE PLANTS— or Small . . .

for activated sludge sewage treatment

NORTON POROUS PLATES *and* TUBES



Aeration is the heart of activated sludge sewage plants all over the world — in large plants and small. And more Norton Porous Mediums are used in this operation than any other make. Over 54 years experience in ceramic product development and the longest experience in the manufacture of fused aluminum oxide porous products stand behind Norton Plates and Tubes. When you desire efficiency of diffuser operation, insist on Norton Porous Mediums for they assure uniform air distribution, great strength, regulated wet pressure loss and long service. R-817a

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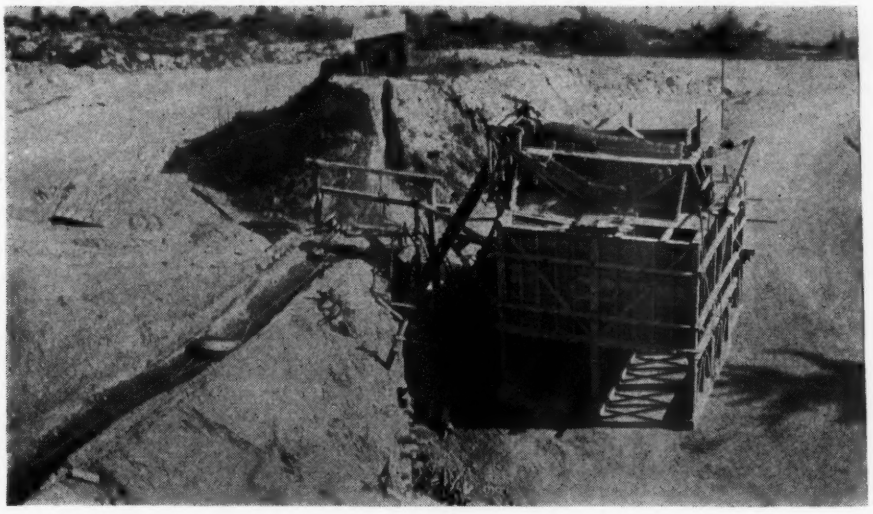


Bangor's crushing and screening plant.

Spring Maintenance of Streets in Bangor

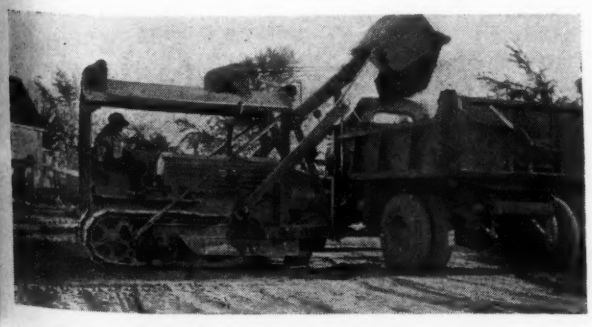
By JAMES L. MacLEOD
Assistant City Engineer, Bangor, Maine

This Maine city, using its municipal force, schedules all the maintenance operations, from sweeping to final honing and rolling; using its own crushing plant and ample equipment.

BANGOR, Maine, has adopted a regular procedure for putting its streets into shape, repairing the damage done by our extreme winter weather and restoring the surface to normal condition. This work is done by our municipal force rather than by contract.

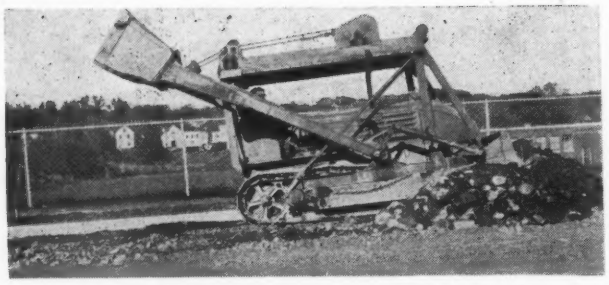
In order to get a clear picture of the whole procedure related to the tarring program, all the various activities must be kept clearly in mind and the work planned so that one item of work will not delay the following item. In other words, the successful operation of the whole program depends upon a careful scheduling of each and every operation. These operations are as follows:

1. Sweeping streets and gutters
2. Excavating and backfilling bad frost holes
3. Scarifying and shaping surface breaks
4. Screening and stockpiling tar covering
5. Patching holes with pre-mixed material
6. Applying tar
7. Covering tar
8. Honing street surface after tar and cover have been applied
9. Rolling the honed area.



Sargent overhead shovel on Cletrac tractor.

Sweeping the streets and gutters starts as soon as the last of the snow and ice has melted, usually about the middle of April. In order to expedite this work, we use rotary brooms attached to two-wheel tractors. These tractors follow one behind the other and sweep from the center of the road to the gutter on each side. In order to prevent a cloud of dust from rising from the brooms, each street is sprinkled with water just ahead of the sweepers. Hand crews follow the



Cletrac tractor with shovel and bulldozer blade leveling base gravel.

Adams 50 motor grader

sweepers and load the dirt into trucks, which haul it to the dump.

A careful check is made of the streets during the spring, when the frost is coming out of the ground, and any bad frost boils are noted. As soon as the ground has dried out sufficiently, these soft spots are excavated about two feet deep and backfilled with coarse gravel. For this work the department uses a Cletrac tractor on which is mounted a Sargent overhead shovel with a ⅜-yd. bucket. This unit also has a bull-dozer blade which is used to level the coarse gravel after the excavation has been completed.

In cases where the surface of the street breaks up but excavation does not seem to be warranted, the roadway is scarified and then shaped to the proper grade and crown, and rolled. The scarifying and grading is done with an Adams 50 gasoline-powered grader, and a Galion 8-ton tandem roller is used for final rolling.

While this preliminary work is being done the city-owned crushing plant is in operation screening and grading the material for covering the tar. This plant consists of a primary 18″ x 36″ jaw crusher and a secondary 14″ x 28″ jaw crusher, both from New England Road Machinery Co. The storage bins for this crushing plant are of 500-ton capacity, and the crushing plant is charged with a ½-yd. dragline bucket. The material going through the screening plant is separated and classified as follows: sand passing the ¼″ screen; peastone passing the ⅝″ screen and retained on the ¼″ screen; No. 2 stone passing the 1¼″ screen and retained on the ⅝″ screen; and everything retained on the 1¼″ screen goes as tailings. These tailings can be by-passed to the secondary crusher, from which all fractured No. 2 stone and peastone are obtained.

The sand and peastone are then yarded from the crushing and screening plant in the proportion of 75% sand and 25% peastone and hauled to a stock pile. This stock pile is held in reserve so that in case of a breakdown of the plant during the tarring season, ample covering will be available.

The application of the tar starts about the last week in May. The first places to receive attention are the scarified areas and excavated sections or any sections of roadway newly built the previous year but not treated. The tar is applied at the rate of ½ gallon per square yard, covered with peastone and then rolled. After this work has been completed, the streets are taken in order and the tar for surface treatment applied at the rate of 0.20 gallon per square yard. The tar is immediately covered with peastone and sand at the rate of from 15 to 20 lbs. per square yard. After a street has been tarred and covered, the whole area is honed, the hone working from the gutters to the center, then working from the center back to the gutters. In this way the tar and the covering are thoroughly mixed, and any holes or depressions filled, resulting in a comparatively smooth surface. This honing is then followed by the rolling, which sets the mixture and eliminates much of the trouble from small particles picking up. It is important that all streets tarred and covered be honed the same day. Satisfactory results cannot be obtained by honing the following day.

The equipment used for this work includes a 1000-gallon distributor mounted on a G.M.C. truck chassis, five G.M.C. trucks with 5-yd. dump bodies, a Burch Under-Truck maintainer attached to a 2-ton Ford truck, and a Galion 8-ton tandem roller.

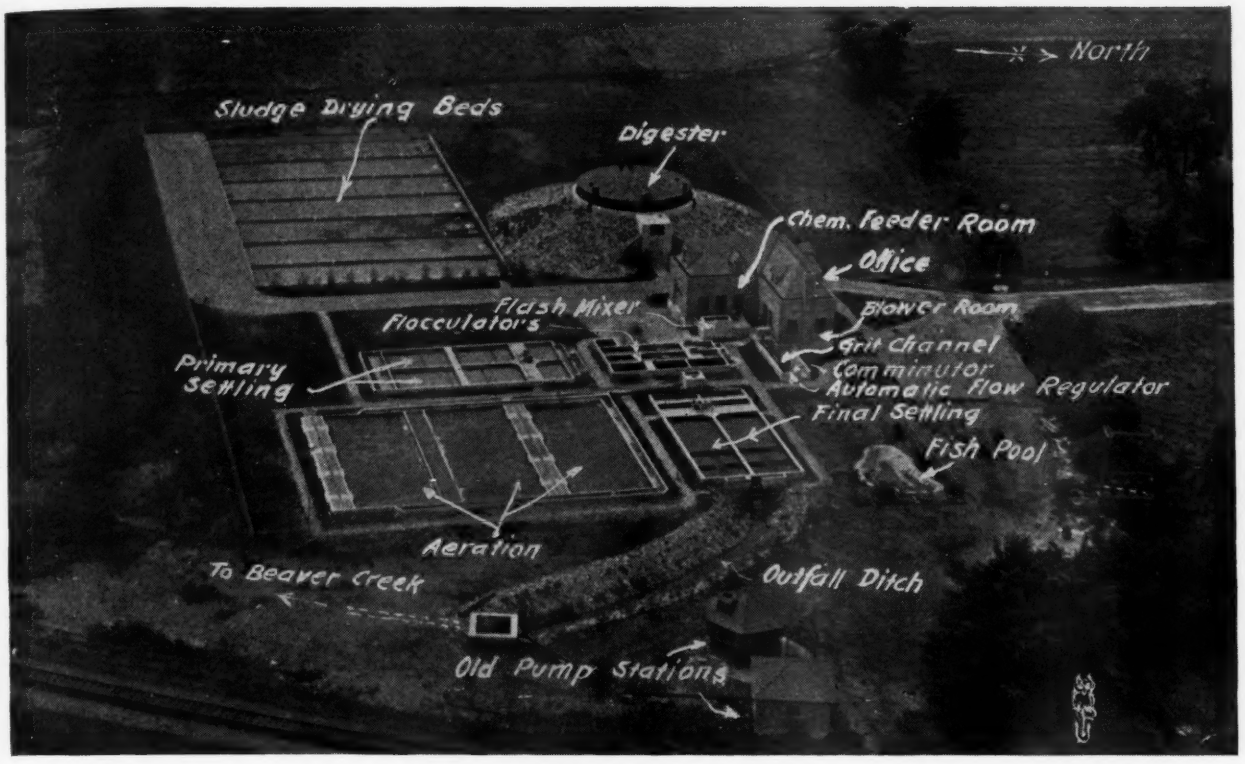
The covering of the tar is done with small disc mechanical spreaders. These spreaders are attached to the back of the trucks and a small sliding gate is put in the tail gate of the trucks. The spreading is accomplished by the truck backing over the tar, and the amount of covering can be controlled by adjusting the small sliding gate. By backing up on the tar the covering is spread under the wheels, thus assuring traction and this also prevents the tar from picking up on the tires.

A patching crew covers the streets two or three days in advance of the tarring, filling all holes or washouts along the gutters. This allows time for the patching material to be rolled into place by traffic, and then the patch is sealed when the surface is treated.

By this municipal maintenance the whole program is under direct control; the amount of tar to be applied can be varied if necessary; there are no questions arising as to the payments due, specifications,

(Continued on page 40)

Covering tar with mechanical spreader on 5 cu. yd. truck.



Air view of Celina sewage treatment plant.

Three Years' Treatment of Sewage at Celina, Ohio

By PAUL A. UHLMANN

Consulting Engineer

Treating an unusual combination of industrial wastes and domestic sewage by activated sludge preceded by chemical treatment.

Mr. Uhlmann says, with reference to this article: "Although every one of the three years of operation had it own characteristics, I hestitated to jump to any conclusions after the first year, during which both the operator and myself had to grope for the solution of the problems as they came week by week. Neither did I consider the second year of operation as being fully conclusive, although very gratifying results were obtained. Whether or not it will be possible to further reduce the operating costs I do not know, as I am still analyzing the detailed operating data from different angles whenever time permits.

"From my experience with the design of a dozen or more activated sludge plants, I consider the Celina plant as the one presenting us the toughest and most interesting problems to solve."

THE village of Celina, Ohio, county seat of Mercer County, is located at the western edge of Grand Lake, which has a drainage into Beaver creek, a tributary of Wabash river. According to the 1940 census, the village has a population of 4900 people.

In 1914, the village constructed a sanitary sewerage system and sewage treatment plant consisting of a pumping station, a pair of septic tanks, and sludge beds. During the last ten years the sewage treatment plant proved to be inadequate and outmoded, resulting in pollution of Beaver creek. This creek serves as the western outlet for Grand Lake, but has very little flow during the entire year due to the small amount of water discharged over the waste weir of Grand Lake.

The pollutional conditions of Beaver Creek were intensified by the discharge of untreated industrial wastes to a drainage ditch that discharged into it, and in 1938 it was considered imperative to construct a modern sewage treatment plant to take care of the domestic sewage and the various industrial wastes of the community.

Industrial Wastes. A considerable amount of industrial wastes is contributed from the plants of the Crampton Canneries, Inc., and the Producers Creamery. The former packs dry and green vegetables and, therefore, operates throughout the year, packing hominy, kidney beans, pork and beans, spaghetti, peas, beets and tomatoes. Based on the 1937 pack, the population equivalent of the industrial wastes exceeded 20,000 persons during the tomato pack. Large war orders during the last two years increased the pro-

EQUIPMENT USED IN CELINA TREATMENT PLANT

Pumps

3 Raw sewage pumps, 1 raw sludge pump, 1 sump pump, by Chicago Pump Co.
1 Hot water circulating pump by Bell & Gossett Co.

Motors

8 small electric motors by Westinghouse Electric Co.
13 others by eight different firms
1 Gas engine by General Motors Corp.

Air Blowers

3 blowers by Roots-Connersville Blower Co.
1 Air filter by American Air Filter Co.

Chemical Feeders

1 Lime feeder and slaker by Omega Machine Co.
1 Ferric sulphate feeder by Omega Machine Co.
1 Freight hoist by Robbins T. Meyers
1 Grit hoist by Manning, Maxwell & Moore

Meters and Regulators

1 Raw sewage meter, 1 industrial waste meter and 1 air meter by Bailey Meter Co.
2 Sludge gas meters by Pittsburgh Equitable Meter Co.
1 Natural gas meter by Sprague Meter Co.
1 Flame trap and regulator by Pacific Flush Tank Co.
1 Flame trap and regulator by Chaplin Fulton Co.

Tank and Basin Equipment

Primary sludge collector, secondary sludge collector, and 2 flocculating units by Jeffrey Mfg. Co.
12 Swing diffuser units and carborundum diffuser tubes, and a comminutor, by Chicago Pump Co.
1 Flash mixer by American Well Works

Other Equipment

Valves by Crane Co., Chapman Valve Co. and Powell
Automatic sewage pump control by Automatic Control Co.
Sewage flow regulator by Brown & Brown
Gas-fired hot water boiler by Bryant Heater Co.
Automatic hot water heater by Lawson Mfg. Co.
Electric control panel by Westinghouse Electric Co.
Incubator by Precision Scientific Co.
Laboratory equipment by Kauffman Lattimer
Automatic water still (runs on sludge gas) by F. T. Stokes Machine Co.

duction of most of the canned goods and doubled some of the packs.

As no records about water consumption were available, the waste-water flow was computed, for design purposes, to be approximately 300,000 gallons per day, allowing for a reasonable increase of production, and the strength was estimated to be about 1200 parts per million of 5-day BOD for the wastes from the Crampton Canneries, Inc.

The Producers Creamery is engaged in the manufacturing of powdered milk, receiving a maximum of 140,000 pounds of milk per day. The population equivalent of the creamery wastes was assumed to be 2400 persons.

Design Flow of Combined Wastes. The lack of flow records of industrial wastes and domestic sewage necessitated the assumption of a domestic sewage flow of 600,000 gallons per day for an ultimate population of 6000 persons and an industrial waste flow of 300,000 gallons per day. Therefore, the plant was designed hydraulically for a total flow of 900,000 gallons per day of combined wastes.

Selection of Treatment Method. The need for a high percentage of purification to satisfy the requirements of Beaver creek, and the comparatively large amounts of strong industrial wastes, created a financial problem which could not have been economically solved by the adoption of the usual conventional method of treating these combined wastes. The extreme fluctuation in sewage flow and strength made it advisable to provide utmost flexibility in plant operation. For these reasons, the combination of chemical pretreatment and activated sludge was selected.

Design Data. The chemicals are used to aid in the removal of suspended matter in the primary settling tanks, thereby reducing the load on the aeration basins. In order to arrive at a basis of design for the secondary units, it was assumed that 65% of the 5-day BOD of the domestic sewage and 50% of the 5-day BOD of the industrial wastes would be removed in the primary settling tanks. It was further assumed that the rate of BOD reduction in the secondary units would follow the relative stability curve for domestic sewage, and that a proportional reduction of BOD during the aeration period could be expected by providing an increased detention period in the aeration basins together with an increased air supply. Therefore, a detention period exceeding 10 hours for a flow of 900,000 gallons per day and an air consumption of more than 2 cu. ft. per gallon was provided.

The treatment plant consists of a Brown & Brown automatic flow control, coarse bar screen, grit channel, comminutor, wet well and pumping station, flash mixer, flocculators, primary settling tanks, sludge digester, open sludge drying beds, aeration basins and final settling tanks.

The basement of the operating building contains a sludge pump; two horizontal, centrifugal sewage pumps, and a 1000 gpm storm-water pump. The sewage flow is measured by means of a Venturi meter before discharge to the flash mixer. The storm-water pump is not connected with the Venturi in order to avoid complications in the measurement of the sewage.

On the sub-basement floor, a gas-fired boiler using natural or sludge gas is located with a water heater and heat exchanger. The painting of the various piping in different colors designating the contents has been found quite useful.

The blower room, the office and laboratory and, in a special wing, the chemical feeder room are all on the main floor of the building. The blower room contains two motor-driven and one gas engine-driven Roots-Connersville blowers. The gas engine, a 6-cylinder GMC truck engine, has been operating on sludge gas for more than 16,000 hours continuously with the exception of the periodic shutdowns for regular servicing.

The chemical room contains an Omega lime feeder and slaker and an Omega dry feeder for ferric sulfate. A circular stairway leads to the chemical storage room which occupies the entire second floor of the building, where space is available for storing 5000 cu. ft. of chemicals. Chemicals are elevated to storage or moved to the two storage hoppers of the dry feeders by an electric hoist.

The office and laboratory contains the necessary laboratory equipment to make routine tests for BOD, DO, total solids, suspended solids, etc. It also contains a tank with tropical fish, the hobby of the chief operator, who makes all the tests necessary for the proper operation of the plant in addition to his regular duties of taking care of all mechanical equipment and plant control.

The aeration basins, which can be operated either in parallel or in series, are operating on the tapered aeration principle, using Chicago Swing Diffusers as means to increase or decrease the air input at different points if and when needed. The possibility of replacing the individual diffuser mediums in a few minutes without interrupting the operation of the basins is highly appreciated by the operator when unusual flow conditions in regard to volume and strength create perplexing problems that stress the flexibility of the plant to the utmost.

Pretreatment of Canning Wastes at their source. Before being discharged to the municipal sewers, the canning wastes are screened in a 40-mesh rotary North screen, and the volume measured in a Venturi flume and automatically recorded at the municipal treatment plant. The installation has proven quite helpful to the operator, who regulates the chemical feeders and air input in accordance with the canning operations recorded in the blower room of the municipal plant.

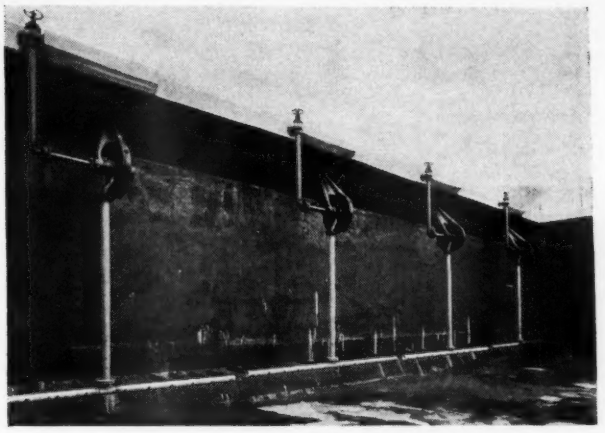
The results obtained during a period of three years of operation have demonstrated the necessity of close cooperation by all parties involved, that is, the industries as well as the plant operator. During the peak of the tomato pack, the canning factory has to guard against a possible breakdown or overloading of the screen at the factory, which in turn would result in an overloading or upsetting of the municipal treatment plant at the most critical time.

Generally, the canning factory has been cooperating satisfactorily and has notified the plant operator of any change or switching in the pack contemplated for the day; as, for instance, the canning of red beets followed by the canning of tomatoes will require a change in the operation at the sewage treatment plant.

On the other hand, the conscientious plant operator will ungrudgingly and rather gratefully answer, at 4 a.m., a phone call from the creamery official who profusely apologizes for having to dump, immediately, approximately 20,000 pounds of sour skim milk. Officially, the working hours of the chief operator start at 8 a.m. but as the municipal finances disallow a third operator, the chief operator prefers to dress speedily and hurry to his plant to start the chemical feeders before the milk stream has a chance to upset the plant. After all, incidents of this kind happen in the best managed plant or factory.

However, it is this kind of close cooperation and coordination which is responsible for the steady high percentage of purification obtained, especially during the last year of operation.

Operating Results. The irregular change of the combined wastes in volume and strength requires a continuous adjustment of the chemical dosage and air input. The feeders are operated only while industrial wastes are being discharged to the sanitary sewers or immediately before unusual loads of milk wastes have to be handled.

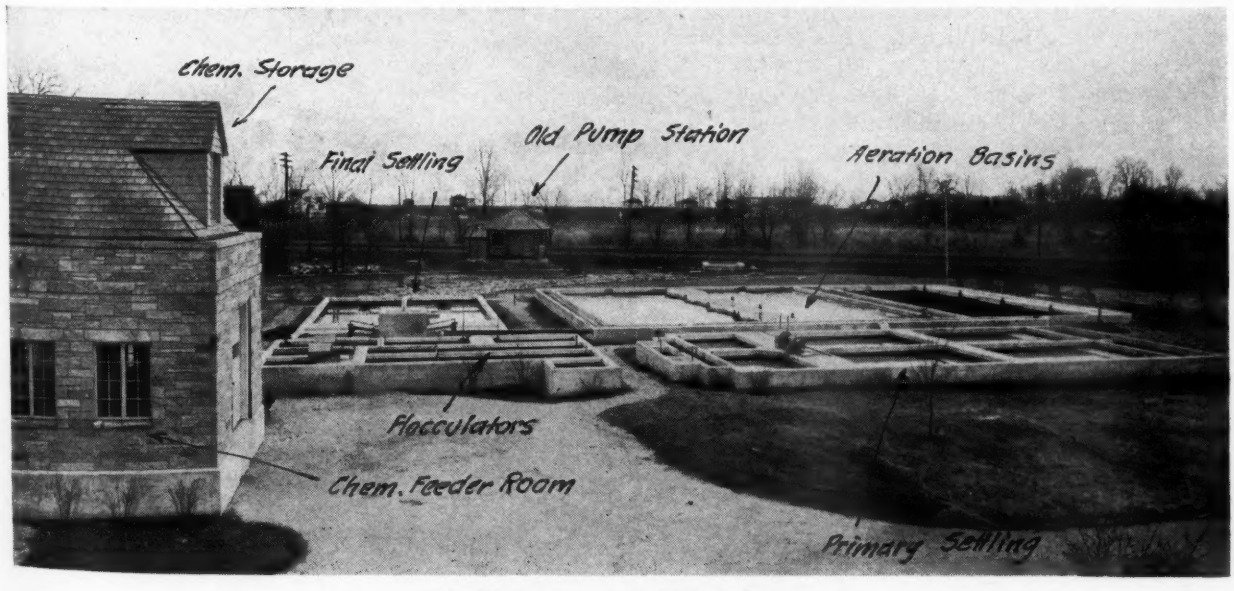


Aeration tank showing swing diffusers.

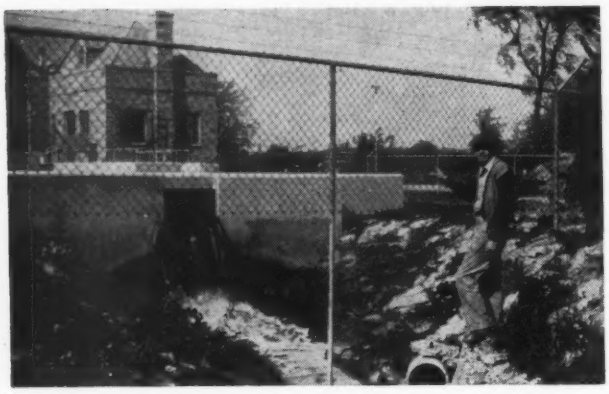
During the year of 1941, the yearly average of the 5-day BOD of the raw sewage was 641 parts per million. The overall reduction amounted to 95%. The removal by chemicals and primary settling was 51%, using 80 tons of lime and 38 tons of ferric or ferrous sulfate. The suspended solids averaged 523 parts per million, which were reduced to an average of 52.4 parts per million. The average flow treated was 436,000 gallons per day with an average pH of 6.1 of the raw sewage. Quite often, the incoming combined wastes have a pH of 4 due to the wastes from the local stearic acid factory, but fortunately these wastes are not large.

During the year of 1942, from January to November inclusive, when industrial wastes were treated and chemicals used for a period of 11 months, the average 5-day BOD amounted to 631 parts per million and the overall BOD reduction was increased to 97%. At the same time, the amount of chemicals was reduced to a total of 39.1 tons of lime and 17.3 tons of ferric sulfate. With this amount of chemicals, a BOD reduction of 46% by chemicals and primary settling was achieved. The suspended solids during the 11-month period averaged 440 parts per million, which were reduced to 36 parts per million.

During the months of January to May inclusive, only two aeration basins were used. However, the unanticipated and unusually heavy bean pack during January and February stressed the plant capacity, and the re-



Looking east across treatment plant.



Final effluent at outfall ditch. Chief operator Baver in foreground.

duced detention period in the aeration basins is reflected in the high BOD of the final effluent. During the period of canning peas and tomatoes, the full capacity of the plant is needed and all three aeration basins are in continuous operation.

Flows up to about one million gallons per day receive full treatment, flows from 1.0 mgd to 1.8 mgd are by-passed after the primary settling tanks including chemical pretreatment, with an average reduction of 45% of the 5-day BOD. Flows in excess of 1.8 mgd (which usually are of short duration) are handled by the storm-water pump, which discharges directly to the by-pass. The Brown & Brown automatic flow control protects the plant against still larger storm flows, which necessitate the use of the 2000 gpm pump in the old pumping station in addition to the total pumping capacity of the new plant.

The perplexity of the problems periodically confronting the operator and challenging his ingenuity are best illustrated by presenting a few "high spots" during the 1942 operating period: During the months of January and February, the canning factory operated daily two shifts of 8 to 10 hours each for 6 days per week, canning beans, hominy and spaghetti. This meant long hours for the vigilant operator. On one day in March, a breakdown in the creamery necessitated the dumping of about 20,000 pounds of skim milk, which had to be handled on short notice. An 8-hour composite sample revealed the following 5-day BOD values: Raw sewage, 2800 parts per million; primary tank effluent, 993 parts per million; final settling tank effluent, 19.6 parts per million. A grab sample taken at 10 a.m. had a BOD of 8453 parts per million.

During the month of May, a total of 252,000 pounds of skim milk, and in June a total of 195,500 pounds of skim milk, had to be taken care of in addition to the regular wastes from washings, etc. When, on a certain day in June, the dumping of 30,000 pounds of skim milk was followed by the discharge of additional 50,000 pounds, the plant was on the verge of being upset, as pea wastes from the canning factory were demanding special attention at the same time.

During the tomato pack, a number of baffling problems of a different nature have been experienced and can apparently be expected every year. The dumping of stearic acid wastes in addition to the highly acid tomato wastes is lowering the pH of the raw sewage to an alarming degree. When the tomato canning reaches its peak and the canning operations are extended to 16 and 18 hours per day, the operator wishes that his town had more domestic sewage during the night in order to ease the problem.

During such periods of shock loads, the operator fully appreciates the value of lime and iron, which considerably increase the flexibility of the plant and protect the secondary units against overloads. A special chapter could be written about changes of the mixed liquor as to color and odor due to the different industrial wastes under treatment. Developing troubles can and must be quickly analysed by the operator observing the appearance of the aeration basins in conjunction with the laboratory tests.

Operating Personnel. The chief operator of the plant is Carl Bauer who normally has one assistant. His duties are manifold and, under the direction of City Manager F. D. Kuckuck, he has full charge of the plant and its control, including the numerous routine tests. Fortunately, his enthusiasm and a pronounced sense of duty and responsibility prevent him from joining the class of swivel chair operators. The author is furnishing periodical supervision of the plant, discussing with the operator his various experiences and problems.

Construction Costs, etc. The plant was constructed in 1939 under the last PWA program and at a total cost of $106,000 for the entire plant including landscaping and new roadway to the plant. It was designed by the author and his office staff, who also furnished general supervision during construction. City Manager F. D. Kuckuck acted as the resident engineer and inspector for the village. The contractor was the F. H. McGraw Company of Middletown, Ohio.

General Conclusions. The results obtained during an operating period of three years have demonstrated the possibility of the economical and satisfactory treatment of strong combined wastes of domestic and industrial nature in an activated sludge plant, provided that it is protected against shock loads and overloads

Looking northeast across treatment plant.

— Sewage Treatment Plant - Celina, Ohio. —

Abbreviated Summary of Operating Data for 1942.

Figures referring to Flow and Lab. Analysis are monthly averages, all others are monthly totals.

Month	Ave. Daily Flow 1000 gal.	Susp. Sol. Raw PPM	Susp. Sol. Final PPM	Settl. Solids Raw cc/liter	Settl. Solids Appr. Sol. cc/liter	5-Day BOD Raw PPM	5-Day BOD Final PPM	Overall BOD % Reduction	D.O. Final	pH Raw	pH Final	Sludge Gas Prod. 1000 cu ft.	Industrial Wastes Canning Hours	Industrial Wastes Milk 1000 lbs.	Chemicals used Lime tons	Chemicals used Iron tons	El. Power for Activ. only 1000 KWH	Remarks
Jan.	405	548	74	20.0	0.9	811	30.7	96.2	5.0	6.0	7.4	403	253	16.0	5.80	2.9	13.0	15000 lbs of Skim Milk in 4 hrs. - Bean Wastes
Feb.	638	371	90	17.0	2.0	635	42.3	93.3	5.8	6.4	7.4	366	312	5.0	4.55	2.7	11.0	Bean Wastes. Canning - Stearic Acid
March	835	317	14	8.9	0.7	618	16.0	97.6	5.1	6.2	7.2	306	0	23.5	0.36	0.10	6.54	20 000 lbs of milk on Ma. 6 th. - Stearic Acid
April	870	336	15	9.3	0.7	382	7.9	97.9	5.3	6.5	7.2	266	39	8.0	1.09	0.47	6.0	Bean Wastes
May	701	415	17	14.2	0.3	741	11.2	98.5	4.8	5.9	7.3	390	0	252.0	2.14	1.17	17.34	Milk dumped in batches of 20 000 lbs
June	588	465	26	16.4	1.5	752	20.7	97.2	4.4	6.2	7.3	417	160	195.5	5.37	1.83	20.6	Skim Milk and Peas.
July	556	512	20	13.7	1.0	566	6.4	98.8	4.6	5.7	7.2	346	133	13.0	2.89	1.10	17.8	Pea Wastes
Aug.	560	538	13	13.0	0.5	483	2.3	99.5	4.6	6.2	7.3	315	192	0	3.34	1.42	11.3	Tomato Wastes
Sep.	584	434	68	35.5	0.6	703	18.9	97.3	4.4	5.7	7.5	408	318	0	6.27	3.05	20.5	Tomato - Red Beets
Oct.	427	459	19	14.4	0.2	616	10.9	98.2	4.8	6.3	7.2	313	165	6.0	4.09	2.0	13.0	do
Nov.	431	397	15	15.2	0.2	430	18.0	95.8	4.8	6.0	7.1	311	43	0	1.21	0.67	7.5	Tomato - Stearic Acid
Dec.	517	231	7	17.3	0.3	524	17.9	96.6	4.7	6.6	7.0	289	0	0	0	0	1.6	Stearic Acid -

Total Flow fully treated in 1942: 187.2 MG.
By-Passed after primary settling: 7 MG

BOD removed by full treatment: 928 600 lbs

Total Operating Cost

Salaries	$ 3403.82
El. Power	$ 2071.40
Chemicals	$ 814.43
Misc.	$ 461.93
Total	$ 6751.58

Total Elect. Power

For Pumping 659.20 KWH
" Activat. 141 220 "
Total 207 140 KWH

Total Chemical Cost

Lime	39.1 tons	$ 406.66
Ferric Sulf.	16 t.	$ 362.24
Alum. Sulf.	1.3 t.	$ 45.53
Total		$ 814.43

Total Sludge Gas Consumpt.

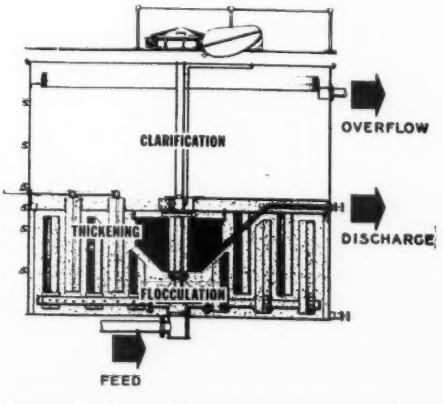
Gas Engine (For 8432 running hours)	2 574 000 cu ft.
Boiler	679 000 "
Chem. Pretreat.	78 100 "
Wasted	799 100 "
Total	4 130, 300 cu ft.

by chemical pretreatment acting as a buffer or shock absorber. A considerable increase of the conventional aeration period seems to be a main requirement, which cannot be replaced by an increase of air input alone. Other essential requirements are flexibility in plant operation and . . . an efficient operator.

Results Obtained by Hydro-Treators*

THE Dorr Hydro-Treator is a unit used in connection with water softening and removal of turbidity, iron, silica and algae. It consists of a round or square tank divided into three separate and distinct zones. In the lowest zone the water is mixed with chemicals and previously formed flocs. In the top zone the flocculated solids are separated from the water, which leaves through surface ports or over a weir. Between these two zones is a thickening zone where the excess sludge is concentrated prior to withdrawal. The raw water enters the lowest zone through slowly rotating distributor arms, and chemical reagents enter this zone through pipes and are mixed with the water. The aim is to secure a continuous intimate mixing of previously formed sludge with the raw water and chemicals by passing the feed up through the sludge blanket in the intermediate zone. When used for water softening, detention periods of 60 to 90 minutes are common; longer periods for coagulation or for removal of magnesium.

Operating results were given for three softening plants and three coagulating plants, four of the six being ordnance plants. In softening Mississippi river water for one of these, the total hardness of the raw water, 240 ppm (172 carbonate and 68 non-carbonate), was reduced to 140; turbidity from 220 to 5; the detention period was 1.0 hr., giving a flow per unit of 4.5 mgd. The same plant, using a detention period of 1.35 hr., reduced the total hardness from 182 to 130 and the turbidity from 300 to 5. In the first case CaO was used at the rate of 10.0 gr. per gal. and alum at 1.4, with no pre-treatment. In the latter case 7.5 gr. of CaO was used, and alum in pretreatment coagulation.



Dorrco "Hydro-Treator." Instead of a steel tank a concrete or wood tank may be used.

An industrial plant treating 2.9 mgd from the Cuyahoga river used a hydro-treator for coagulation. The detention period was 1.71 hr. Alum was added at the rate of 3.0 gr. per gal.; no pretreatment. The turbidity was reduced from 50-70 ppm in the raw water to 2-10 in the hydro-treator overflow.

*Abstract of a paper by W. A. Darby before the Engineers Society of Western Pennsylvania.

John F. Sanders, Superintendent.

Raymond F. Bishop, Chemist.

Testing and Treati Wat

By RAYMOND F. BISHOP and JOHN F. SANDERS
Chemist and Superintendent, respectively, of the Boonville, Missouri, Water Dep

TO PRODUCE a pure and soft water for the people of Boonville, Missouri, a new, modern water treating plant was completed in 1937. As the source of supply was the polluted, muddy Missouri river, and as the methods of treatment were new, a close laboratory control was required.

After some months of operation, when the difficulties of putting a new plant into operation had been ironed out and all of the proper equipment and material obtained, complete mineral and bacteriological analyses were begun, daily samples being analyzed of both raw and finished water, and also of water in various stages of treatment throughout the plant.

Outside of the laboratories operated by the Missouri State Board of Health in Jefferson City, the laboratory in the Boonville plant was the only place in the central section of Missouri where complete analyses were made. This fact soon became known to some of our friends living in surrounding rural districts, and occasionally a sample from a rural water supply was brought to our laboratory for examination. In most cases, testing the sample for Coli-form organisms was the extent of the examinations. However, in a few instances where suspended material would not settle in a cistern supply, a small dosage of lime and aluminum sulfate was recommended and used to settle the material. These recommendations were made only after a complete coagulation test had been made in the plant laboratory. A few times activated carbon has been used to remove unpleasant tastes. A surprisingly large percentage of the rural supplies was found to be contaminated with the Coli-form organisms.

In the spring of 1939 it was decided to outline a program whereby we could help guarantee our farm friends a supply of potable water. With the approval of our Board of Public Works, a full page advertisement was run in a local farm journal, explaining to the farmer the necessity of pure water and offering, if there was any doubt about their own water supply, to make an examination free of charge. Also, material would be furnished to treat the supply in case it was contaminated. As a number of samples had previously been brought to the laboratory in various types of unsterilized bottles it was emphasized that no official results would be given on any rural supply unless a sterilized bottle was first obtained from our laboratory, with instructions as to how to collect the sample.

As such services previously had been given only by the State Board of Health, there seemed at first to be very little interest among the rural residents, but as time went on and a case or two of typhoid fever was reported in the rural sections, more interest was aroused, which resulted in more and more calls for sterilized bottles.

BOONVILLE WATER DEPARTMENT, Boonville, Mo.
WATER SAMPLE INFORMATION CARD

Make out one card with pencil for each sample and return in container

Place .....

Date of collection..... Hour.....

Collected by .....

Owner of supply .....

State whether Sample collected from Dug, Drilled or Driven Well, Cistern, Spring, Stream, or Tap (give location or address) .....

.....

Bottle No..... Remarks: .....

.....

DO NOT WRITE IN THESE SPACES

Date Rec.....A.M., P.M., Exp., Mail Lab. No.....

By .....

Coli Aerog. Det.

Amt. 10-ml.	Presumptive		Formate Broth		Endo	Completed		Gram stain	Count per cc	Remarks	Final Result No. Tubes Positive
	24-hr.	48-hr.	24-hr.	48-hr.		24-hr.	48-hr.				
1											
2											
3											
4											
5											

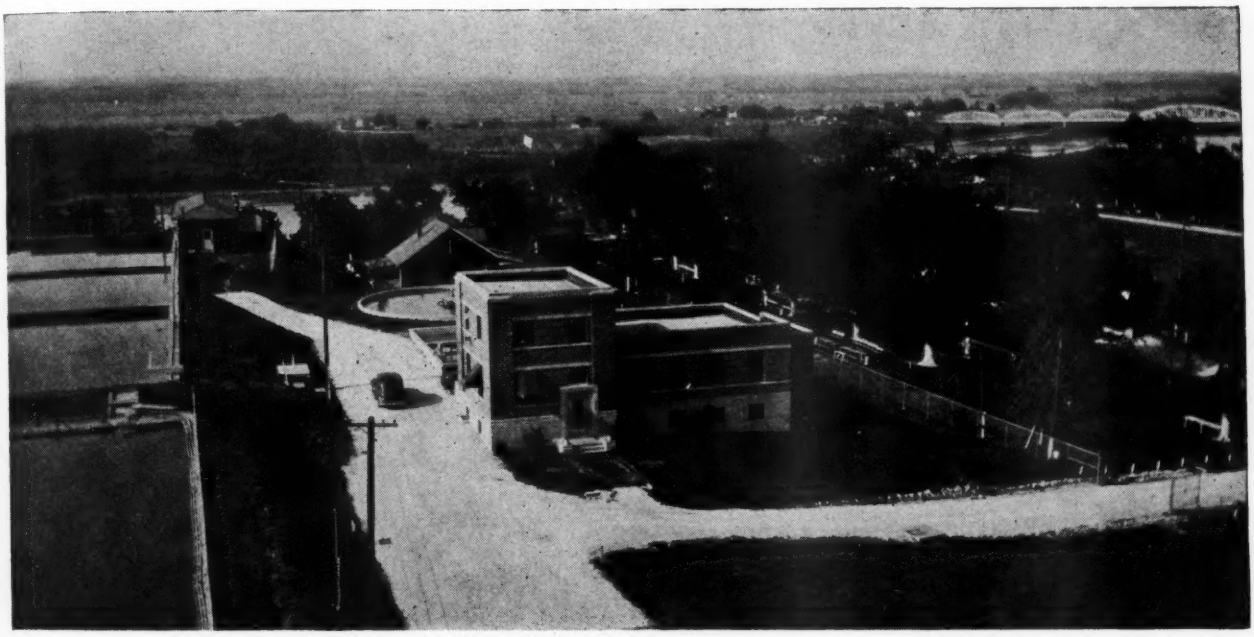
Card to be filled out and returned with sample.

By the end of the year 1939, bacteriological examinations had been made on 90 rural supplies, 66 of which were found to be contaminated. During 1940, out of 130 examinations, 112 were proven contaminated. In 1941 tests were made on 163 rural supplies and 141 were found contaminated. During the first ten months of the year 1942, 208 examinations had been made and 179 samples found to have Coli-form organisms present. Most of the contaminated sources from these 591 samples were treated with a chlorine carrier (H.T.H.), the only ones that could not be made safe being a few which apparently were fed by a contaminated vein of water.

In treating a contaminated supply, several different types of chlorine carriers can be used, such as H.T.H., Perchloron, chloride of lime, sodium hypochlorite, etc. However, the more highly concentrated forms, such as H.T.H. and Perchloron, are preferable in our opinion. When preparing advice for treatment of a supply, the

Water Supplies in Rural Districts

The laboratory of Boonville's water supply analyzes water samples from schools and farms throughout the county, and furnishes advice and materials for treating contaminated supplies.



View of plant from elevated tower.

approximate number of gallons is first obtained by getting the depth of water and diameter of the supply. A 6 to 8 ppm treatment is generally given. In case of a cistern, the H.T.H. is dissolved in one to two gallons of water and the solution poured into the cistern water and at once thoroughly mixed with it, either by a bucket on a rope or, if a chain pump is in the cistern, satisfactory results can be obtained by pumping and letting the water fall back into the cistern.

When a drilled well is found to be contaminated, two large capsules, such as are used by veterinarians, holding about 45 grams of H.T.H. each, are dropped down inside the well casing. These capsules will sink to the bottom of well and dissolve, releasing the H.T.H. and a strong chlorine solution will be formed at the bottom of the well. After about five days the well is thoroughly pumped and another sample collected for examination. This double check is made on every supply, well or cistern, five days after treatment.

Plant laboratory where samples are tested.

If after treatment the source of supply is found still to be carrying contamination, about the only safe way of using the water is by treating it in a container as it is used, or by boiling it. A treatment can be worked out by obtaining about a gallon of the water and running a chlorine demand on it, which will determine the strength and amount of chlorine solution to be used. It has been found by us in these cases that a bleaching solution such as Clorox or Purex, which can be purchased at most grocery stores, is very satisfactory and simple to use. By adding the solution by drops from a medicine dropper, a simplified method of treatment can be worked out where the owner can add a certain number of drops in a container for each gallon of water to be treated.

Contamination in most supplies is found to be caused by poorly constructed covers or tops, and being located

BOONVILLE WATER DEPARTMENT

Report of Bacteriological Examination of Water Samples

Samples Collected by:

Date of collection:

Place:

Date Reported:

Laboratory No.	Source of sample	No. of 10 ml. portions examined	No. of 10 ml. portions showing presence of "B" Coli group	Total plate count per 1 ml.

The above examinations were made by the Boonville Water Department in accordance with the latest Standard Methods of Water Analysis of the American Public Health Association.

Boonville Water Department

by

Form on which results are mailed to owner.

where surface runoff seeps into the supply rather than away from it.

When a sample of water is brought in or mailed to our laboratory, it is examined according to Standard Methods of Water Analysis. The owner is notified by a form letter as to the results of the examination, and if the supply showed contamination, it is recommended that he call at the plant laboratory with the dimensions of the well or cistern, so that a correct treatment may be given him.

A card is sent out with each sampling bottle on which the owner fills in information on one side and, after the laboratory tests are made, the results are recorded on the opposite side and kept on file in the laboratory for future reference. A carbon copy of the form letter mailed the owner is also kept on file.

In this county there are 67 rural school supplies. In August of each year, examinations of these supplies are made by us and treatment furnished to those found contaminated. This gives the school children a safe water supply to start off the school term.

Advice is gladly given to anyone constructing a new cistern or well, and for the remodeling of old ones.

On July 4, 1942, with the Missouri river at flood stage, 7½ inches of rain fell within five hours, which sent the river out of its banks and flooded all of the low river bottom land throughout this area. This, of course, left all the rural supplies that were flooded highly contaminated with river water and caused an acute danger of a typhoid epidemic in these rural districts.

To try to prevent an epidemic, the county health doctors made it possible for anyone in the flooded area to be inoculated for typhoid fever free of charge. The personnel of the laboratory in the Boonville water plant also made a special effort to assist in every way possible to help the owners of the flooded supplies get them cleaned and purified so they could again be used safely.

It was considered useless to test before treatment any of these supplies that had been flooded, as the river water is known to be highly contaminated. As it was necessary to clear the supplies of contamination immediately, packages of calcium hypochlorite (H.T.H.) were weighed out in 100, 150 and 200-gram dosages and these packages were distributed, by the doctors and through the personnel of the water department, to owners of the flooded supplies. The owner was given the size package of H.T.H. which would treat his particular supply with at least 6 to 8 ppm of available chlorine, with instructions for using the material. In most cases this dosage was sufficient to eliminate all traces of contamination. However, occasionally where an examination was not entirely satisfactory after the first treatment, a second treatment was applied. Approximately 300 supplies were treated in this manner, and the services extended by the county health doctors and the water department were greatly appreciated in the rural districts of the flooded area. As a result of the fine cooperation received in this area, not a single case of typhoid was reported. We feel that the many extra hours of work in helping our farm friends in this emergency were well spent, as by helping to prevent a typhoid epidemic a feeling of good will was created throughout this whole community.

Each year we find this additional work more interesting and we believe the good will created among the folk in the rural communities has been of great benefit to us.

Much credit for the success of our work in this program must be given to Major C. Hagar who has been superintendent of this department until recently. He guided and assisted us in the work, especially in the administration of details necessary in such a program.

Growth of City Manager Plan in 1942

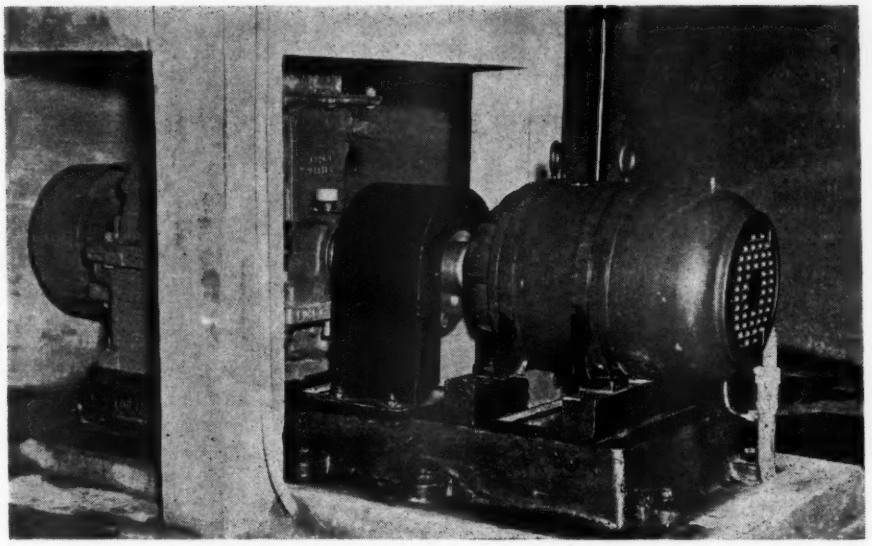
Twenty-five cities and one county adopted the council-manager plan during 1942; this represents the largest number of adoptions in any year since 1923, and brings to 573 the number of local units operating under the council-manager form of government. The addition of Laramie, Wyoming, and Mountain Brook, Alabama, brings to 40 the number of states having council-manager cities. With the adoption of the plan by Trois Rivieres, Quebec, there are now 18 Canadian council-manager cities.

Three cities over 50,000 reorganized their form of government. Lowell, Massachusetts, and Houston, Texas, adopted the council-manager plan, and Dearborn, Michigan, adopted the strong-mayor form of government. The council-manager plan adopted by Cambridge, Massachusetts, in 1941 went into effect during the past year.

Subsurfacing An Above-Ground Pumping Station

A concrete runway for the new Army Air Corps School at Sioux Falls, S. D., now passes over a pumping station that was formerly above ground, and the overhead power lines have been buried; thus freeing the flying field of obstructions. The pump house, which was built over one of the city's 50-foot diameter wells, was removed and the motors, pumps and other equipment were placed on a platform in the well below the ground surface, suspended from a concrete roof flush with the runway, which passes over the well. The city officials had trouble getting steel to support the new concrete roof; however, they finally bought an old steel railroad bridge and used it in the reconstruction. During the entire changeover the well was kept in operation

This work was described by Rhea Rees in a paper before the South Dakota Water and Sewage Works Conference.



Jeffrey garbage grinder used in Bostons' Harbor Defenses.

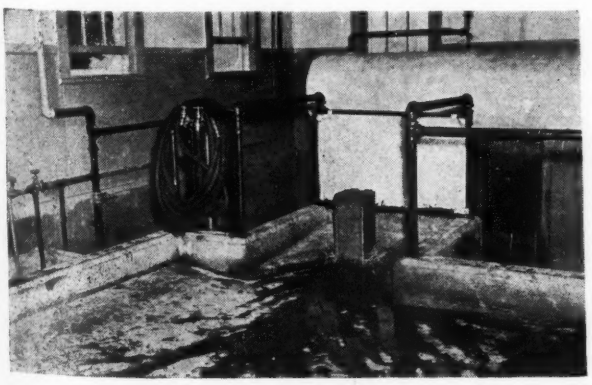
The Army Tries Garbage Disposal By Grinding

By Major R. N. CLARK and Capt. ARTHUR HEIFETZ

Garbage at isolated island army posts, where hog feeding and sanitary fill are impracticable, is ground fine and discharged by sewer into tide water.

THE disposal of garbage on isolated island posts presents several troublesome problems owing to the restriction in choice of disposal methods. Any or all of the common means of garbage disposal may be impractical on account of the location of the post, and unusual methods must be applied to meet the situation and to prevent sanitary nuisances.

Disposal of edible garbage to a contractor is impractical in cases where the cost of boat transportation outweighs the commercial value of the refuse. Even if this were not true, space on boats is at such a premium that transportation of garbage could not be considered in many cases. The same difficulties apply to incineration of garbage in locations where fuel must be transported by boat. Neither the cost of fuel nor its transportation by boat may be justified if any other means of disposal can be adopted.



Sorting slab for large grinding unit.

The use of sanitary fill is practical in some instances, but in New England the small off-shore islands which are chosen for fortification because of strategic reasons are usually little more than barren outcroppings of ledge rock and neither space nor soil are available for sanitary fill. Without sufficient covering material, a sanitary fill soon becomes an insanitary dump, with all the accompaniment of flies, rats, odor and unsightly nuisances.

Frequently the easiest method of disposal is by dumping into tide water from shore or dock, depending on tidal action to disperse the material and the scavenging of gulls to eliminate any floating edible matter. This means of disposal usually results in the deposit of organic matter along the shore and encourages the breeding of rats and flies. Experience indicates that the dumping of garbage from the shore into tide water is practical for short periods, but when such disposal is practiced for an appreciable time, nuisance conditions usually develop.

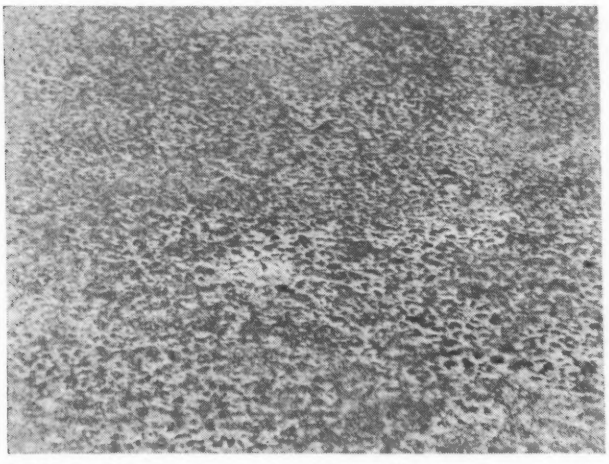
In an effort to meet these problems the Harbor Defenses of Boston have made use of garbage grinder stations at which wet garbage is ground to small particles and discharged through sewers into tide water. By this means most floating matter is eliminated and daily discharge at some distance off-shore in deep water does not lead to objectionable conditions. There are two types of disposal units, one designed to handle garbage from an entire post, the other to grind garbage from a single battery mess. Both types have proved to be satisfactory.

(Continued on page 38)

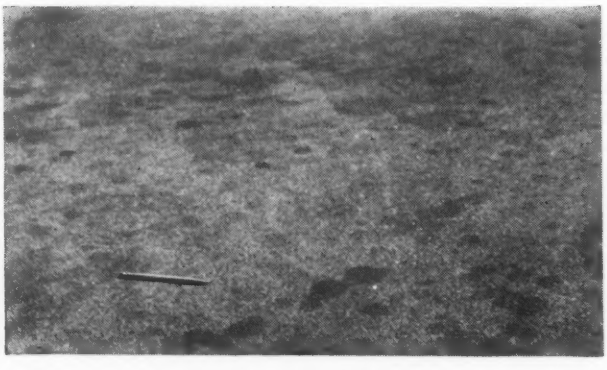
Maintenance of Bituminous Concrete and

Years of applying oil-bound wearing surface resulted in uneven surface and high crown. Rebuilt with bituminous concrete and oil penetration on crushed stone, they are giving good service with reduced cost of maintenance.

THE streets of Princeton Borough, New Jersey, are nearly fifty per cent of water-bound or semi-water-bound stone roads, resurfaced with oil and fine crushed stone every two or three years. Some of these roads have had so many such treatments that there is now from two to three inches of oil-bound wearing surface. Previous to 1936 over eighty per cent of our roads were of this type; not constructed properly nor with proper material, the base being particularly poor. The old saying "A good road must have a tight roof and a dry cellar" applied in this case, for drainage also was bad and frost boils often would appear in many places after a hard winter. The surfaces of the roads, while fairly tight, were very uneven and the crown was excessive, there being in some cases an 18-inch crown in a 30-ft. roadway. The cost of surfacing these roads every two or three years amounted to as high as $18,000 per year or 12 cents per square yard. In those days the stone covering was spread by hand and tar was used.



Voids in a bituminous concrete road later filled by squeegee coat and grit.



Same surface as above treated with squeegee coat and grit.

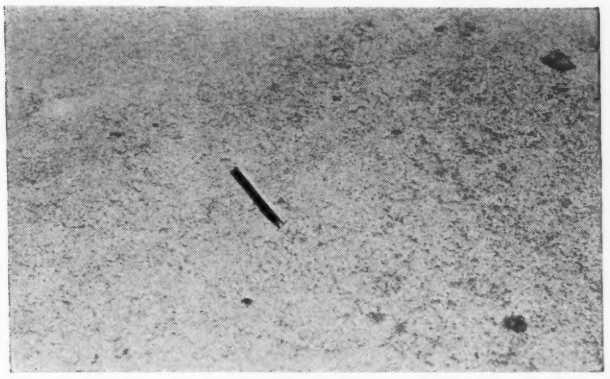
Since 1936 our remaining oil macadam roads have been surfaced with asphalt (H. K.) applied at the rate of 1/3 gallon per square yard and covered with ⅜-inch crushed trap rock applied at the rate of 22 pounds per yard. Last year we resurfaced 28,000 square yards at a unit cost of seven cents per square yard. We now use a mechanical stone or grit spreader and have all of our trucks arranged with a chute in the back to discharge into the spreader. The spreader not only saves labor but it gives a more uniform spread of the stone and requires less stone. Furthermore, four times as much yardage can be covered in a day and thus the nuisance of blocking roads and interfering with pedestrians and traffic is lessened. This spreader, which is also used in the winter for spreading grit on icy roads, cost only $145 and has been one of our best investments, having paid for itself several times over.

Five years ago we started a program, with state aid funds, of replacing about a mile of old-type road each year. Two types of road were adopted for the new construction — bituminous concrete and oil penetration, each on a crushed stone base. The bituminous concrete was equally divided into a hot mix (New Jersey State Highway, F. A. B. C. 1) and a cold mix of type A or type T State Highway. Some patent bituminous concrete was used but its use was later discontinued because of its rolling qualities. Standard F. A. B. C. 1 uses a fairly coarse stone and often leaves considerable voids, making it necessary to squeegee the surface, and the last mix that we used was modified somewhat by using a ⅜-inch stone, which gave an excellent surface finish.

The old streets were reconstructed by removing the entire base and excavating so as to give not more than three inches of crown rather than the existing 12 to 18 inches. The new road was made a total of 8 inches thick in all cases. The base consisted of five inches of 2½-inch stone, usually placed in two layers, filled with screenings and rolled. Wherever possible, underdrains were laid and outlets provided; over six miles of new drains being completed. The bituminous concrete surface was laid as follows: Two inches of modified penetration was placed on the base, using 1½-inch stone and 1¾ gal. of tar or asphalt per sq. yd. (In most cases asphalt was used because it was less expensive.) Only the major voids were filled with half-inch stone—just enough to permit the modified penetration to be rolled. The remainder of the voids were filled and the 1-inch surface laid by spreading the bituminous concrete at the rate of about 115 pounds per square yard.

enetration Urban Roads

By I. RUSSELL RIKER, C. E.
Engineer for the Borough of Princeton, N. J.

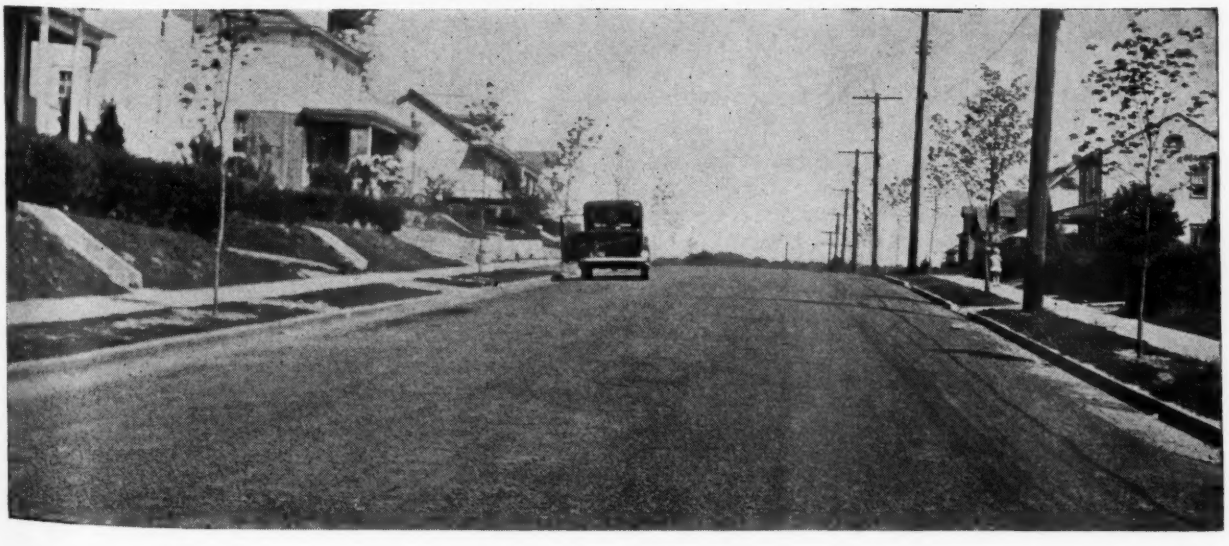


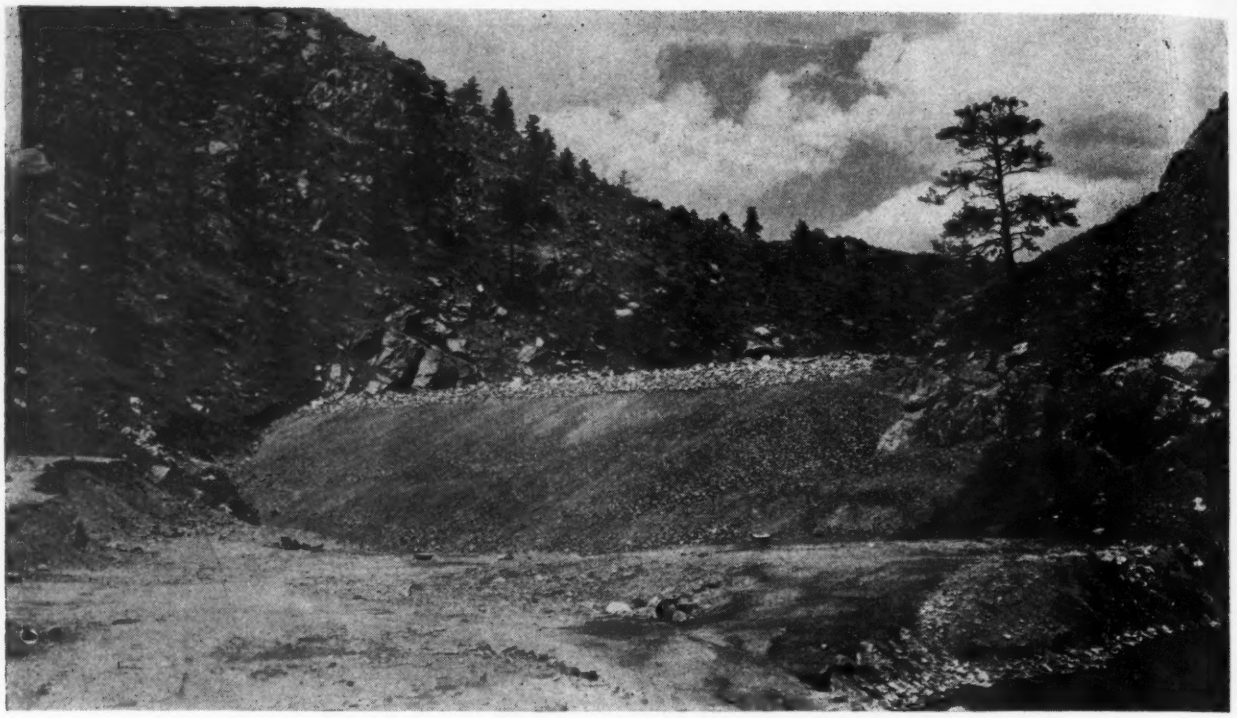
At *Right: top*—Penetration road after seal coat before squeegeeing. *Bottom*—Penetration road after squeegeeing. *Centre:* Salvaging ballast in reconstruction of an urban street. Note stone back of curb. *Bottom:* Rough surface, oiled and surfaced with ⅜ inch.

A total of between 2½ and 3 gallons per yard of penetrating tar or asphalt was used, followed by a seal coat of ½ gallon per yard.

It was found that, after four or five years, each of these roads needed some surface treatment; further-

(Continued an page 38)





View of down-stream side of dam. The tunnel is at the right, outside the picture.

Construction of the Milton Seaman Dam By Greeley, Colo.

By ROY E. SEAMAN and C. G. KLEIN
Superintendent and Clerk, respectively, of the Water Department

Building of an earth dam in a remote canyon delayed and cost increased by difficulties in obtaining labor and overcoming priority restrictions.

THE Water Department of Greeley, Colorado, had for some time been considering increasing its limited storage facilities by constructing a reservoir located sufficiently high in the mountains to give good pressure in the city; and when the superintendent of the department, Milton Seaman, was consulted in 1940 by local irrigation companies in connection with locating a dam for them on the North Fork of the Poudre river, he found a site apparently suitable for the city's use. This was about 50 miles northwest of Greeley, at a point on the North Fork where the canyon narrowed between two high points to a width of about 300 ft. and a depth to the canyon floor of 190 ft. Also there was a secondary depression or saddle immediately to the east which was remarkably well suited to serve as a spillway without much additional work.

A prominent geologist of this region, Mr. Vanderwilt, was consulted concerning the rock in the bed and sides of the canyon at the proposed site and found it suitable, free from faults and adaptable for drilling. It was proposed to construct an earth dam with impervious core, and a large amount of material suitable for the latter was found only a few hundred feet from the site, as well as sufficient quantities of materials needed for semi-pervious and pervious fill—a factor of great importance, as hauling in materials from any great distance would have increased the cost of the project immensely.

The dam was designed to be 92 ft. high and 190 ft. long, with slopes of 3 to 1 on the downstream side and 2 to 1 on the upstream side. A by-pass tunnel 18 ft. in diameter and 300 + ft. in length was constructed through the rock east of the dam, to be controlled by

North fork of the Poudre as it enters the tunnel. Taken at high stage when running 2,000 sec. ft.

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View of camp taken from west side. The dam is at the right. This area will be flooded when reservoir is filled.

four 5 x 5 ft. sluice gates, and was used to carry the flow of the river during construction.

Work on the dam started late in 1940 as a WPA project, to furnish work for 200 men, working in two shifts. Some of the men showed fine adaptability for tunnel work and became very proficient in using drifters. But from the start there was difficulty in keeping a full crew on the job as regular employment became abundant, and in June, 1942, furnishing WPA men and supplies was discontinued. The city, however, continued the work, using more equipment where practicable and employing extra hand labor when necessary. The equipment used included a 1½ yd. Thew shovel, a 50 and a 91 bulldozer and tractor, air hammers and tampers, and about a dozen trucks. Since August 1st a group of conscientious objectors have been located at a former CCC camp four or five miles from the dam down the canyon and about 15 of these have been working on the dam.

A camp to accommodate 175 WPA workers was constructed immediately above the dam site, using city-owned lumber from discarded wood water pipes. It included a restaurant, offices for the WPA office force, a hospital (which received remarkably few cases), a garage and repair shop, a power plant to generate current for lights, and a house for the watchman. A large tank buried above the camp stored pure mountain water which was piped to the camp. The WPA furnished the food and the city furnished clean bedding and linen and laundry service. The camp has not been used since the work was discontinued as a WPA project.

The first construction started was on the by-pass tunnel. This was in solid granite. Forty per cent Hercomite was used, with caps in five delays—a combination especially manufactured for hard rock which proved very satisfactory. The tunnel required no bracing as no soft layers were encountered. No serious faults were cut and the water entering the tunnel was of minor amount. The tunnel was completed in 60 working days.

Meantime preliminary work had started on the dam. Loose rock and dirt were removed, a cofferdam built for the core, and the foundation for this was cleaned. The core trench was about 25 ft. wide and 10 ft. deep, all blasted from the bed rock in the bottom of the canyon and the side walls for the height of the dam. All crevices and cracks were cleaned thoroughly with clean water under pressure. In this trench the impervious material was spread in 8-inch layers, each layer being tamped thoroughly around the edges and packed and rolled with a sheep-foot roller. The entire dam was built up in 8-inch layers.

The problem of priorities has presented some difficulties. More or less breakage and repair of equipment was inevitable and there was increasing difficulty in obtaining repair parts and materials, as priorities of only a secondary nature were assigned to the work in spite of its importance to the city's water supply. Also it has been impossible to obtain the four 5 x 5 ft. sluice gates needed for controlling the flow through the tunnel. The city, aided by the state engineer, obtained an A-10 rating for these, which was raised to A-1-j in September, at our request; but even this was not high enough to interest any manufacturers, who by this time have devoted so much of their energies to war effort that it probably will be impossible to get the gates for the duration of the war. .

The gates are to be of the oil-operated type, using 24′ oil-operated cylinders with a gasoline engine for motive power, sufficiently strong to withstand a 75-ft. head, estimated to cost $25,000 including installation. The specifications for these gates, as well as for the dam itself, were drawn up or approved by M. C. Hinderlider, state engineer of Colorado.

The dam is at present ninety per cent completed, with about twelve feet of fill remaining to be placed. It has been estimated that the structure, when completed, will store upwards of 7,500 acre-feet of water. When the lake thus formed is filled to capacity, it will extend over two miles upstream, receiving the run-off from over 200 square miles of mountain drainage area.

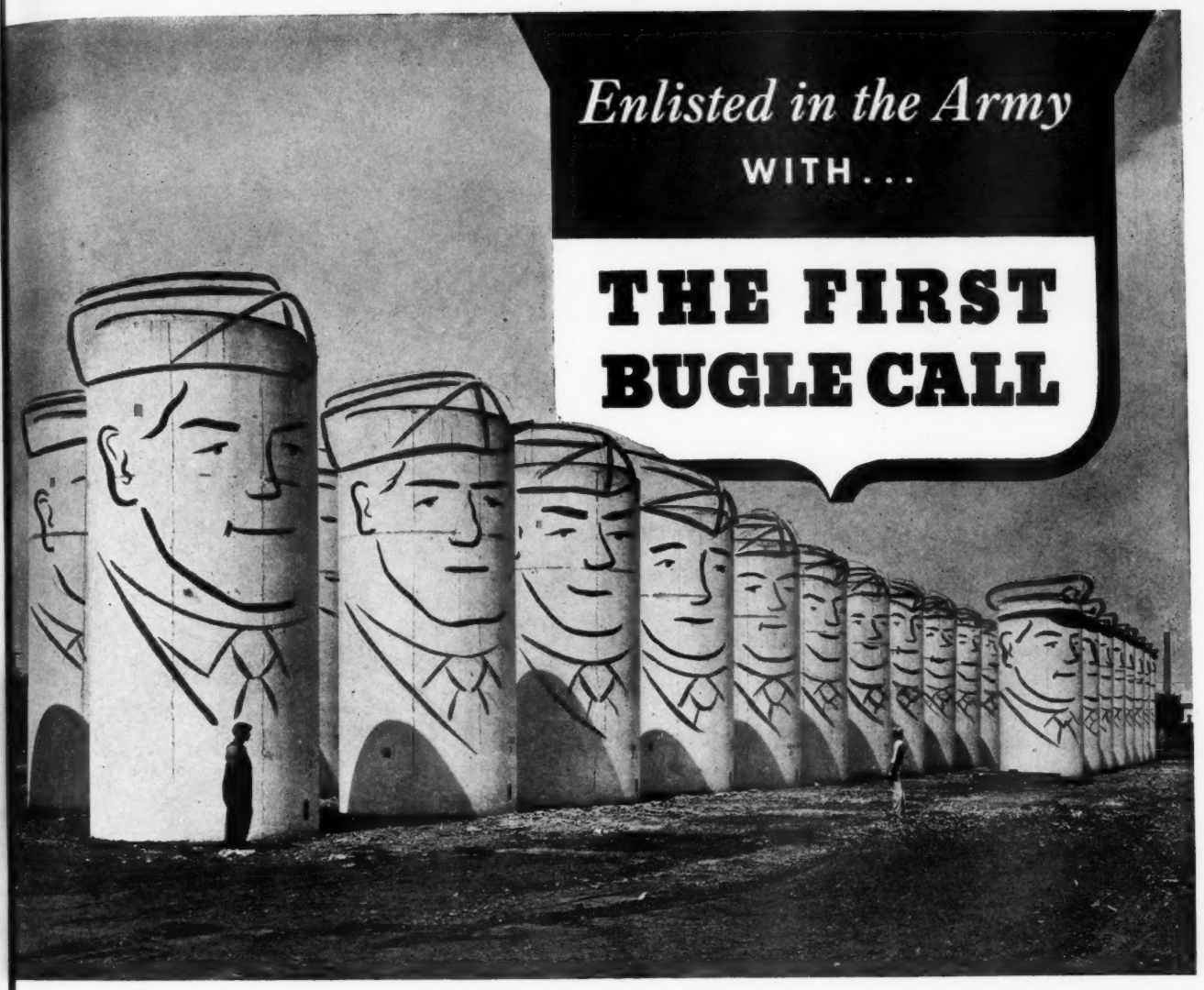
The cost of the structure to the present time has been $144,293. This was increased by the gradual loss of WPA labor, which had to be replaced with machinery at great expense to the city. The estimated cost to complete will be $225,000.

The dam was named for Milton Seaman, who was superintendent of the Water Department of Greeley for over thirty years. It was through his efforts that the system reached its present high state of efficiency. During the years he was in office, practically the entire transmission and distribution systems were rebuilt and enlarged.

Recovery of Hydrant Rentals

The owner of a franchise granted by a village was obligated to construct and maintain a waterworks system in accordance with approved plans and specifications. The rates to be charged were to be adjusted from time to time between the parties. A contract was executed pursuant to the franchise ordinance by the mayor and clerk for the rental of fire hydrants. The water company which acquired the franchise constructed the waterworks system in 1929, it was accepted by the municipality and water had since been furnished to the inhabitants in accordance with the franchise and contract.

In an action by the trustee for the waterworks company against the municipality for hydrant rentals the Ohio Court of Appeals held (Baxter v. Village of Manchester, 29 N. E. 2d 672) that the municipality, having exercised the power granted to it under the Ohio Constitution to contract for its water supply pursuant to such an ordinance and having received the benefits under the contract so made, was estopped in this action to assert that the contract was entered into but two days after the passing of the ordinance and before the publication or effective date thereof and for that reason was invalid. Judgment for defendant was therefore reversed and the cause remanded for further proceedings.



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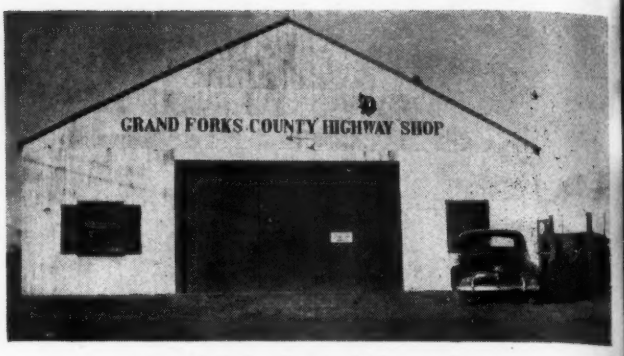
When you need special information—consult the classified READER'S SERVICE DEPT., *pages 63-65*

Board of County Commissioners and Road Overseers: Fred Hansen, Auditor and Sec'y.; James Bolger; Nicolai Eddie; E. O. Bry; Clifton McIntyre; W. E. Block.



Grand Forks County highway shop.

Road Maintenance in Grand Forks County, North Dakota

By J. W. HARTY
County Engineer of Grand Forks County

Maintaining a complete system of records, budgeting funds, and systematic financing with joint county and town funds, made possible the maintenance of all important county roads.

GRAND Forks County, North Dakota, which is rectangular, 36 by 45 miles, has a small population but a large production of agricultural products which necessitates adequate transportation facilities extending to all parts of the county.

Previous to 1934, when I became County Engineer, the county did not have the services of a full-time engineer for supervising the designing and constructing of its highways, and there were no records of any kind available covering previous highway operations. As rapidly as possible necessary files and records were established, involving making an inventory of roads and bridges and their conditions, and operating costs; and establishing budgets, reporting system and other features of operation necessary for efficient administration.

We now have set up in this office a complete system of records of all operations, obtained through submission of daily time cards by all highway employees. A close check is maintained on purchases, the purchase order system being employed; all bills are audited and approved by this office before presentation to the Board of County Commissioners. A card filing system on the existing bridge and drainage structures is being established and the accounting of all monies for highway purposes is maintained in the office. Monthly statements are submitted covering all receipts and expenditures, and an annual report is submitted covering all operations and giving in detail the unit costs of operation of each unit of county-owned equipment together with the breakdown of project cost during the preceding year.

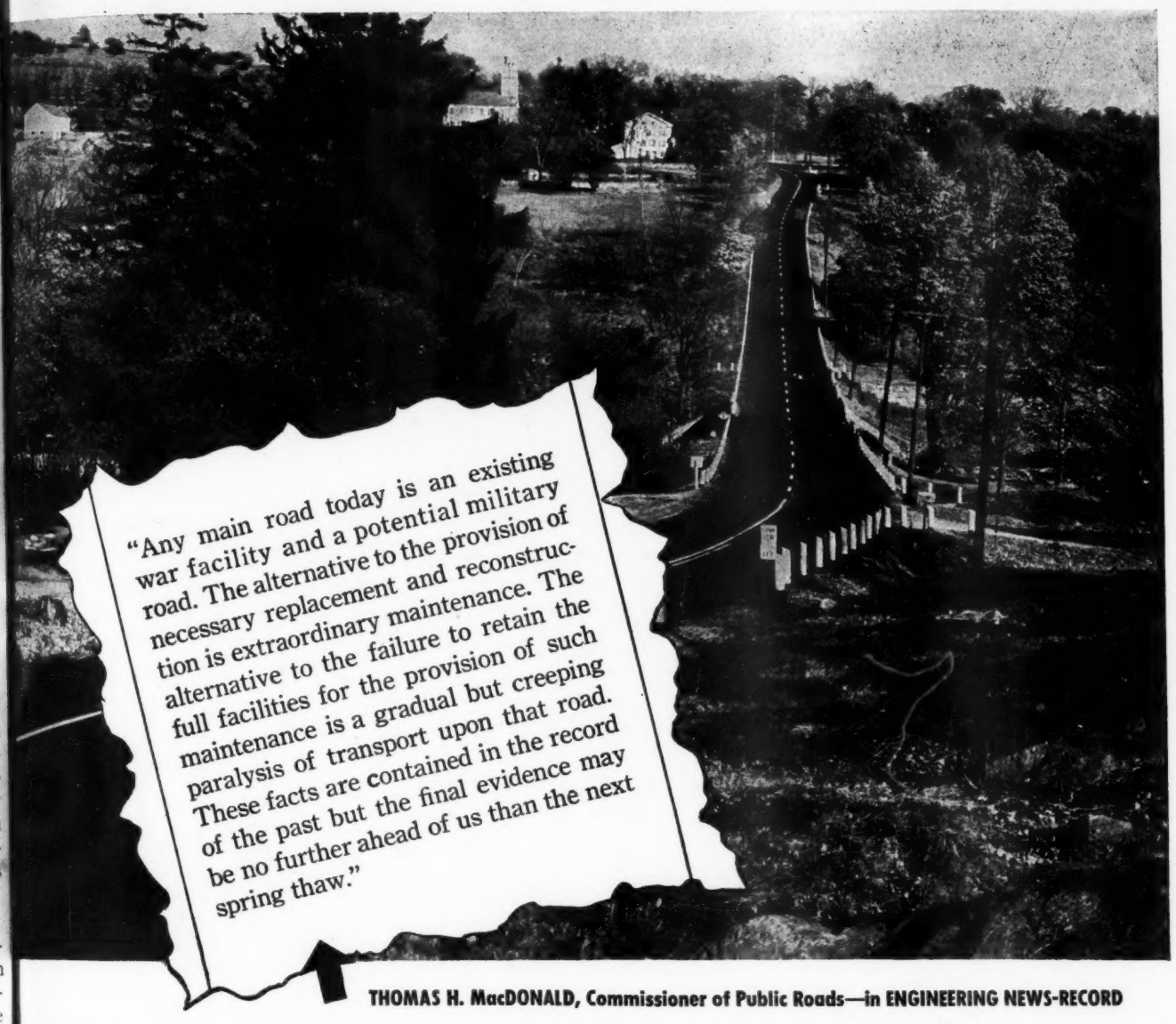
We prepare all our own plans and specifications, following the standards set up by the North Dakota State Highway Department. We budget our funds, allocating money to each road district on a percentage basis established after serious consideration had been given to the requirements in each district, and in addition funds are established for expenditures of a general nature. Also we have established an emergency fund, which the title explains. These funds are each maintained and accounted for individually. Improvements and additions to the system are being made as difficulties with the present methods arise.

Finances

During recent years the increased burden of necessary welfare expenditures, together with the diversion of gas tax, has made the problem of financing highway construction very difficult, not only for the counties, but for the state as well. At the same time the severe drought conditions resulted in a decided drop in tax payments. One of two solutions was available; either the county could be bonded to the extent necessary to finance these obligations, or some of the operations of the county could be curtailed or eliminated to provide the money necessary for welfare purposes. Rather than bond the county, with the resulting increase in indebtedness and interest payment, the Board of County Commissioners elected to reduce the road and bridge program to its bare necessities in order to make available this additional revenue. At the present time the county does not have any bonded indebtedness; and through a well planned and administered program we have been able to make very substantial progress in the maintenance and construction of roads and bridges due, of course, to a very large extent to the federal aid which has been made available through the various sources of C.W.A., F.E.R.A., N.R.W.R., and W.P.A.

In 1937, the financial condition of the state was such that the then Bureau of Public Roads agreed to place federal aid highway monies in the state without match-

ATTENTION! HIGHWAY OFFICIALS AND ENGINEERS



THOMAS H. MacDONALD, Commissioner of Public Roads—in ENGINEERING NEWS-RECORD

THUS Commissioner MacDonald sums up the vital problem of wartime road maintenance and repair hat faces highway officials and engineers today.

Excessive wear to tires and damage to cars are only art of the cost of poor roads. Neglected highways mean elays in transportation of vital food and military supplies, lost man hours by America's industrial workers.

In considering your maintenance problems, remember that there is a right type of Tarvia* and a right Tarvia method for almost every type of road maintenance and repair. The Barrett Tarvia field man will be glad to show you the most economical ways to service your district quickly and dependably. He has at his command all Barrett's 37 years of successful paving experience.

Let him suggest how you can keep your roads in the best condition to meet the requirements of a nation at war.

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Al Dowhower, shop foreman.

ing, provided that all counties and the state agree to spend the entire receipts from gas tax and motor vehicle fees for maintenance purposes alone, in order to attempt to bring the existing highways to adequate standards for present highway traffic. This agreement was in force for a period of two years and all of the counties in the state cooperated to the fullest extent in this program. Since that time, through a well planned program, the state, together with many of the counties, have made great strides in bringing their residents out of the mud.

The entire resources of the County Highway Department are dependent solely upon the receipts from gasoline tax and motor vehicle fees, which approximate $100,000 per year. Since 1936 there has been no diversion of these funds to any purpose but road and bridge construction and maintenance, and it is now unconstitutional to so divert them.

The sharp reduction in monies available for road construction, together with the increase in public demand for improved highway construction and maintenance, resulted in serious consideration being given to a means for carrying on a long-range program which would ultimately provide a means of access to market for all the farmers and residents in this county. The situation was something like this:

The county is divided into five road districts. The commissioner in each district is the road supervisor for his district, who works in conjunction with the County Engineer's Office in the construction and maintenance of roads, also acting as an inspector and supervisor on this work. This plan of having each commissioner act as road overseer in his own district has proven very satisfactory. These men have a real interest in the work and cooperate completely with the engineer. Since each must cover his district on other county affairs, we obtain our inspection of highway work at small added cost.

The county owns three complete grading outfits, which at the present time consist of the following:

1—Caterpillar D7 diesel tractor
1—Allis-Chalmers Model "L" gas tractor
1—International TD-18 diesel tractor
2—Adams 42" elevating graders
1—Austin-Western 48" elevating grader
3—Super Reliance blade graders
1—Adams 5-Yard hauling scraper
1—Killefer 2-Yard roll-over

It was apparent that the county itself could not finance with available funds a program that would result in any material benefit to the county for many years. To overcome this, a plan was developed whereby the townships work with the county in the construction of roads, on about a 50-50 basis, thus providing twice the amount of money for construction purposes that could be made available by the county alone. This program has its advantages and disadvantages. It is definitely an advantage to have the additional money available and to accomplish the construction of the additional miles of road each year that is possible with this increased fund. The disadvantages are: 1. It is difficult to get the townships to realize the value of the standards of construction set up by the county; however, each year the townships become more and more awake to the value of streamline road construction in this section and more willing to expend the additional money necessary per mile for this type of construction. 2. In dealing with 41 separate and distinct boards of township supervisors, it is difficult to get them to realize the importance of a general county-wide system of roads leading definitely from and to some point rather than merely constructing a mile of road here and there to favor good neighbors. This difficulty also is gradually being worked out as the townships and their residents realize more fully the benefits derived from a well planned system of county-wide roads.

Construction Plans

Standards of road construction in this county have been set up with the idea of building a certain amount of snow removal into the road. In this territory, where snows blow severely, the following streamlined standards have been adopted: Secondary Roads: Not less than 22-foot top, and in most cases 24-foot top; 2½:1 inslopes, a nearly flat ditch section, and 2:1 back slopes. This road is built on a 66-foot right of way, with back slopes additional. Primary Roads: Not less than 26-foot top; 3½:1 inslopes, a nearly flat ditch section, and 4:1 back slopes. These roads are built on a right of way of approximately 80 feet.

In the past four years, under this program, there has been built a total of 381 miles of roads. A large portion of these are in the main county system and conform to a large extent to county standards.

Using the same procedure, it has been possible for us to surface or resurface some 340 miles of road, involving the placement of 230,000 cubic yards of gravel. We are fairly well situated for gravel material, there being many small pits located in the western half of the county and one large county-owned pit in the center of the county; and placement of it is quite reasonable in cost, because the pit-run material requires very little crushing and screening to obtain properly graded road mixture. This makes it possible to load the majority of our projects with a gasoline shovel, in many instances turning out 100 yards of material per hour.

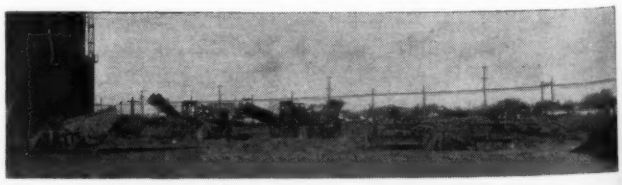
Highway Maintenance

The county owns and operates six heavy-duty motor patrol maintenance units, as follows:

2—No. 12 Caterpillar diesel patrols
2—Austin-Western "99" diesel patrols
1—Austin-Western Sr. "77" gas patrol
1—Allis-Chalmers No. 54 gas patrol

These patrols are all equipped for snow removal work. In addition to the patrols, we operate 8 trucks, using them for hauling supplies, replacing traffic gravel, hauling bridge material, and other miscellaneous work.

During the four years above mentioned, county patrols traveled a total of 135,500 miles, maintaining county and township roads, removing snow, and aiding in road construction when necessary. The



Open storage space, showing 3 elevating graders, 3 blades, 3 snow plows, 1 scraper.

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WHATEVER your requirements, there is a Cleveland Paving Breaker exactly suited to the job. The 80 lb. C7 is the right tool for average work—two C7's run from a No. 85 compressor. For heavier work, use the C9; it is 2 lbs. heavier, but uses no more air. C9 is a slugger that licks the toughest, reinforced concrete. For light work, trimming, etc., try the C10, the little fellow with the big wallop. Three C10's run from a No. 85 compressor. Model C11 is the 58-pound machine with the long stroke and the heavy "slugging" blow—a favorite wherever used. Extremely economical as to air consumption.

Among accessories you can't beat "Clevaloy' chisels, moils and miscellaneous paving breaker tools. Try the 14" narrow chisels, they cost no more than moils, but cut faster. Then specify tough, durable Cleveland "Veribest" air hose. Finally, connect it with Cleveland quick-acting Type "A" hose couplings, and you are all set for the toughest paving breaker job.

Ask for Bulletin 128 on Cleveland Paving Breakers

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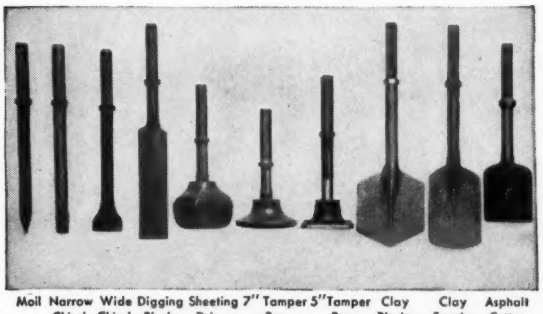

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county is turning to diesel type machinery as rapidly as possible as we have definitely proven that it gives a material saving in cost. In spite of the severity of our climate for maintenance purposes, especially for snow removal, the necessity for operating on a reduced budget requires us to forego the purchase of desirable and advantageous snow removal machinery. However, we feel that the result achieved with the equipment available has been very satisfactory. We have been amazed at the amount of roads that we have been able to open under the most difficult conditions with our heavy patrols working in conjunction with high speed trucks.

County Shop

In 1938, through a W.P.A. project, the county constructed a 50′ x 100′ central shop building located at Grand Forks, at a location giving considerable open storage space surrounding the building. Previous to this time, all major overhauling and repair work on county equipment had been let out to private mechanics and garages, but it was apparent that savings could be effected by the establishment of a properly managed county shop. This shop was completed and a shop foreman hired in 1939. The operation of the shop has fully justified the establishment.

The shop is equipped to handle the maintenance and repair work of all county-owned equipment, with few exceptions. Equipment has been purchased as funds would permit and we will continue to equip the shop in this manner. The policy of operation has been to have a major overhauling of all grading equipment during the winter months and an overhauling of other equipment as conditions and work permitted, with a view to having a complete check on each piece of equipment at least once a year. When a unit is brought in for overhauling, the operator of that equipment works with the shop foreman in order that he may become fully acquainted with the mechanical makeup of his machine—a knowledge which is important for all operators.

The coordination of shop records and operating records obtained in the Engineer's Office give us detailed records of operating maintenance costs on all county equipment.

The War Emergency

(Continued from page 7)

Copper and Lead

By an order issued February 2, orders with preference ratings of A-1-j or higher are no longer automatically exempted from the restrictions on the use of lead imposed by Conservation Order M-38-c, which permitted lead to be used where necessary for essential production, because of the increasing assignment of ratings in the AA series.

Copper scrap is the number one industrial salvage problem for 1943.

Public Works Purchasing Under CMP

The Controlled Materials Plan goes into full operation on July 1, supplanting the existing priorities system for obtaining critical materials. Such materials will be classified as for 1—production, 2—construction and facilities, and 3—maintenance and repair. Allotments of these materials will be made through "claimant agencies," one of which is the Office of Civilian Supply.

Allotment numbers constituting a right to receive delivery will be assigned to "prime contractors," who will pass on the allotment numbers, as necessary, to their sub-contractors and suppliers. Materials other than "controlled materials" will continue to be distributed through the priorities system. Steel, copper, and aluminum have already been included under CMP.

Engineering for Post-War Public Construction

FWA, under date of March 1, states that engineering work for post-war public construction is now under way in 22 states where highway departments are preparing detailed plans and specifications for roads and bridges estimated to cost $170,000,000. This engineering work is being financed from a special $10,000,000 fund authorized by the Defense Highway Act of 1941. Plans for a highway building program to cost nearly $500,000,000 are developing rapidly. The projects approved to date include 85 major rural highways, 80 alternate routes around cities, 40 major city arteries, and 9 rural and 7 urban limited-access highways.

Rates or Charges by Public Utilities

OPA ruled in February that no public utility shall make any general increase in its rates or charges which were in effect September 15, 1942, unless it first gives 30 days' notice to the Office of Price Administration.

Warning Against O.C.D. Model Ordinance

The National Institute of Municipal Law Officers, 730 Jackson Place, N. W., Washington, D. C., have issued a warning against a "Model Civilian Defense Ordinance," O.C.D. publication 3622, December, 1942. They state, "This release is sent to warn you that this O.C.D. proposed ordinance is full of confused and illegal provisions all pointed up to changing O.C.D. from an advisory to a regulatory agency."

Before you adopt this ordinance consult your attorney for more details concerning the act.

Industrial Scrap Urgently Needed

The Industrial Salvage Section of the War Production Board and other salvage officials say one of the greatest problems facing the war program is the shortage of good industrial scrap. Approximately half of every finished steel product fighting on the battle front is made of scrap. Our armament production would fall down immediately if we relied on steel made from 100% pig iron. Scrap is steel to begin with and shortens the refining process. Scrapless steel has to be made in blast furnaces and there are not enough in U. S. to maintain production at the present level.

A special appeal is made to city engineers, city managers, county engineers and superintendents and managers of water works to look over the equipment and machinery on hand. If any of it is not being and has not been used for six months or a year and is not sure to be needed in future, either find a use for it or scrap it.

Idle machinery and equipment is of no value to a municipality or county, so why not scrap it now when it is needed to help build what our fighting forces need to win the war?

This new A. S. A. Law of Design means that the weights and thicknesses of cast iron pipe are *scientifically designed for specific laying conditions.* No more risk of under-guessing. No more over-guessing to be safe. You get the proper thickness for the service required.

Our members will of course continue to manufacture cast iron pipe in accordance with previously established specifications—A. W. W. A.—A. G. A.—Federal Government WW—P—421. But it will be obvious that the new factors in cast iron pipe design can save thousands of tons of metal with resultant large economies to pipe users.

Thus, cast iron pipe keeps in step with American Industry's swift wartime progress in design and production. Known for *longest life* by official records—proved to be *lowest in maintenance cost* by a nation-wide survey—*salvaged or re-used* by hundreds of cities—it is now scientifically designed for specific laying conditions. And it is more economical than ever. Cast Iron Pipe Research Association, Thomas F. Wolfe, Engineer, Peoples Gas Bldg., Chicago.

CAST IRON PIPE
RESEARCH ASSOCIATION, CHICAGO
CAST IRON
NO. 1 TAX SAVER

Wartime Chlorination Practice

In a paper bearing this title, read at the Eleventh Annual Georgia Water and Sewage School, Col. W. A. Hardenbergh, Chief, Sanitary Engineering Branch, U. S. Army, explained that Army water supplies differ materially from municipal supplies; important factors in this regard including new plants, distribution systems and the almost continuous extension of every supply.

The Army has adopted for fixed installations a chlorine residual of 0.4 p.p.m. to be maintained at all times in all commonly used parts of the water distribution system. This does not apply to dead ends, fire hydrants or similar places where there is not constant circulation of the water. This residual is required after a contact period of thirty minutes. Where the maintenance of such a residual creates a serious taste problem, ammonia may be used in conjunction with the chlorine, in which case a residual of 0.6 p.p.m. is required after a detention period of not less than one hour. Provision is also made for break-point chlorination and the after use of ammonia.

For field water supplies it is the custom of the Army to require a residual of 1.0 p.p.m., believing that a satisfactory residual is the most effective safeguard for any water supply, and that, under conditions often prevailing in the field, the residual must be higher than for fixed installations if safety is to be assured.

Pumping Sludge To and From Digestion Tanks

Probably one of the greatest troubles in the operation of digestion tanks is the direct result of sludge pumping to the digester and withdrawal of digested sludge from it. Both large and small plant operators have a tendency to pump at too rapid a rate and for too long a period. The objections to this practice were briefly stated by D. C. Reybold of the Dorr Co. in a paper before the North Dakota Water and Sewage Works Conference, from which the following excerpt is taken.

It should be remembered that sludge is a light blanket in the hopper of any settling tank. A fast pumping rate first pulls the sludge directly over the suction pipe and then pulls in sewage since the balance of the sludge blanket cannot slough into the hopper as fast as the pump requires. This effect we term pulling or breaking through the sludge blanket and has many serious results in the digestion tank.

1. A great deal of sewage is pumped to digester and very little sludge.
2. This volume of sewage must be heated and as it cannot produce gas to heat itself, this is an uneconomical procedure and may cool digester to a point where gas production is negligible.
3. This volume of sewage requires space, thereby decreasing the day's digestion time for sludge and consequently producing a semi-digested, offensive final product.
4. This volume of sewage must be returned to plant as supernatant liquor. Supernatant liquor is relatively high in B.O.D. and suspended solids and should be kept at a minimum for good plant operation.

In addition, such methods of pumping may still leave the greatest percentage of sludge in the clarifiers, which will turn septic, becoming odorous and unsightly.

Experience has shown that frequent but short pumping periods at low pumping rates produce the best digestion results. Pumping two or three minutes every hour not only keeps the small plant clarifier clean, but also more uniformly feeds the digestion tank, giving a clearer supernatant liquor and more uniform gas production.

Sewerage Charges Based on Actual Use

Sewers, like water systems, are owned and operated by municipalities in their proprietary capacity, not governmentally, the Pennsylvania Supreme Court holds. In re Petition of City of Philadelphia, 16 Atl. 2d 32. A municipality is not required to construct, own or operate such public utilities. It may contract with private corporations or individuals to furnish such service, or it may own and operate the utilities for the benefit and convenience of its inhabitants and property owners. In such ownership and operation the municipality stands on the same footing as a private corporation and is entitled to the same privilege of receiving payment for the service rendered. These charges are not taxes, nor a substitute for taxes, but charges made, without discrimination, for an industrial service rendered in value equal to the respective sums charged. The consumer, by using the facilities with knowledge of the rates charged, by implication contracts and agrees to pay the rates. His obligation to pay rests on contract rather than on any exercise of the taxing power.

The Pennsylvania Sewer Rental Act was held to apply solely to charges based upon actual use of the sewer system, and requires that the charge be reasonably proportional to the value of the service rendered and not in excess of it. It therefore would not authorize an ordinance requiring payment not only by owners of properties actually connected with the sewer system, but by all to whom it is made available.

Velocity in Filter Washing

In a discussion of this by plant operators at the Fourteenth Annual Meeting of the North Dakota Water and Sewage Works Conference, the following experiences were told:

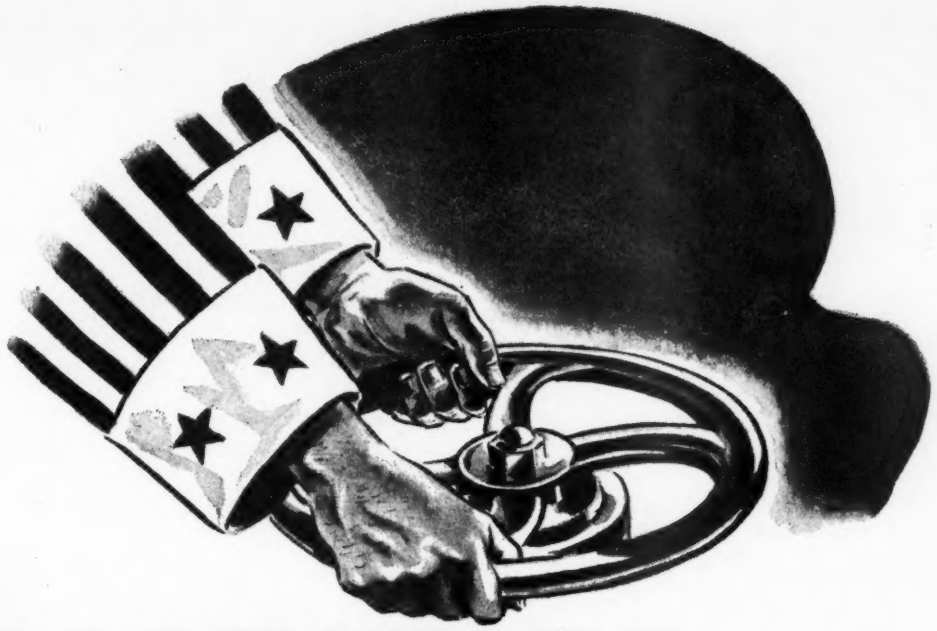
The Fargo plant uses a low velocity wash with air agitation. The filters are washed for approximately ten minutes with a rise of 12" per minute. The operators have had no trouble with the mud balls or sand balls since the filters were rebuilt in 1912. Five million gallons of water is filtered before the filters are washed. The superintendent is a firm believer in low velocity wash with air agitation.

Grand Forks formerly used the low velocity wash with air agitation. In 1929 the plant was rebuilt and high velocity wash was provided. Filters are washed clean weekly regardless of their condition. Personnel is well satisfied with high velocity wash.

Bismarck formerly used low velocity wash. The filters were rebuilt and the plant now has high velocity wash on 6 filters with surface wash on 3 of them. To this date the high velocity wash with surface wash has been very satisfactory. Less washing time is required and less growth is experienced in the filters using the surface wash than in those without the surface wash.

At the Jamestown plant which filters softened well water, some trouble is experienced with sand growth. The filters are washed after having filtered one million gallons of water. The filters are washed for a ten minute period; the percentage sand expansion being used as a wash indicator.

The Williston plant filters are washed weekly with low velocity. Little trouble has been experienced with mud balls or in keeping filter clean.



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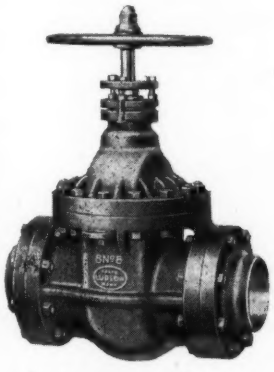
a necessary blessing!

Ludlow Hydrant



Ludlow Gate Valve

A Necessary Evil?—this was our first impression of the Priority idea and its restrictions on buying, manufacturing and selling. But as we saw America answer the Axis threat, we came to regard the pinch of Priority as a Necessary Blessing!

We are glad to be able to give Uncle Sam our best efforts. We are glad, too, that a portion of our production may be allotted to our friends in the water works field who have priority rating. In real necessity, a high priority rating is usually granted. But without it, regulations do not permit us to fill orders promptly.

To aid our customers, we will furnish them with interpretations of priority regulations and amendments sent us by the War Production Board. We will serve you in every possible way till Victory allows our usual complete fulfillment of your valued needs.

THE LUDLOW VALVE MANUFACTURING CO., INC.
TROY, NEW YORK

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LUDLOW SINCE 1866 VALVES

When you need special information—consult the classified READER'S SERVICE DEPT., *pages 63-65*

The Army Tries Garbage Disposal by Grinding

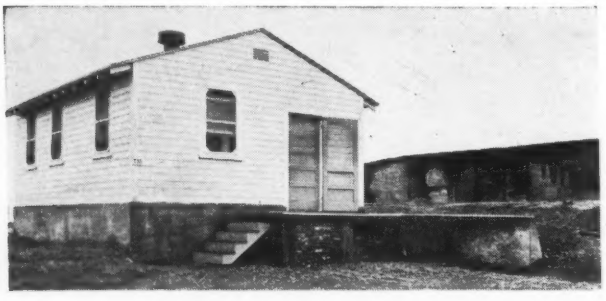
(Continued from page 21)

The smaller unit is of the same type as the standard commercial garbage grinder. Each machine is installed under one end of a serving counter in a cafeteria-type mess, and the hopper of the machine takes the place of the customary garbage can. Reasonable caution must be observed, but no special attention from trained operators is necessary. Pieces of bone and metal or similar objects do not damage the mechanism, but care should be used to prevent the dumping of such material. The operation of these individual units eliminates most of the handling of wet garbage. The use of GI cans is reduced, the spilling of garbage around racks is largely eliminated, and the nuisance of handling wet sloppy material is greatly lessened. Ground material is discharged directly into the sewer, through which it is discharged into deep water off-shore.

The larger unit is housed in a garbage grinder station, including a loading platform, sorting slab, can washing equipment and water heater, all housed in a substantial frame building. All garbage from a post is transported in cans to this station, where the cans are emptied, washed and returned to the loading platform, to be returned to the batteries.

The grinder is a 7½ horsepower hammer mill, capable of handling 1,000 pounds of wet garbage per hour. This type of machine is subject to mechanical damage from hard objects, and it is necessary to sort the garbage and remove all large bones and foreign objects before grinding. The sorting slab is depressed below the floor level, and is pitched to drain into the hopper opening so as to facilitate washing the garbage into the machine. Cans are dumped onto the slab and the material is sorted over, after which it is raked or hosed into the grinder. A metal guard is provided over the hopper to prevent personal injury to the operators. Certain precautions must be observed, such as starting the machine with the hopper empty, and it has been found to be good policy to train one man in the use and care of the machine and to put him in direct charge of its operation.

Complete can washing machinery has been provided, consisting of a concrete soaking tank, a jet washer and a rubber hose with nozzle. An adequate supply of hot water is available during the washing period. In practice, very little use has been made of the tank and jet washer, as a thorough hosing with hot water appears to give satisfactory results. If necessary, the cans are scrubbed with a hand brush to loosen persistent deposits. The cans are returned to the batteries clean and free from organic coating, eliminating the need for can washing in the battery area.



Garbage grinder station.

Observation over a period of several months indicates that grinding garbage for disposal to sea in sewage is a practical and sanitary method of disposal. Combustible rubbish can be burned without much difficulty in a simple incinerator, provided wet garbage is otherwise eliminated. The use of grinders is limited as to locality, since the addition of ground garbage to sewage may overtax sewage disposal plants or natural bodies of water used for final disposal. Competent studies should be made in every case to insure that no undesirable conditions will be created by the addition of garbage in sewage.

The garbage grinder installations of Boston were designed and installed under the supervision of The Post Engineer, Fort Banks, Mass., under the direction of the New England Division Engineer.

Maintenance of Bituminous Concrete and Oil Penetration Urban Roads

(Continued from page 23)

more, while the bituminous concrete roads had a very smooth surface, there were often a number of voids in it, while the penetration roads were rough in appearance. We experimented on a number of surface coats and finally found one which we believe to be very satisfactory and have used for several years. It consists of applying 0.2 gal. per sq. yd. of a natural asphalt or an H. K. over the surface by means of squeegees (so far we have done this entirely by hand), which fills the voids and leaves enough on the surface to hold a grit, which is also applied by hand at the rate of 10 pounds per square yard. This grit is crushed granite similar to chicken grit, and is expensive, costing $4.12 per ton delivered to the job, as it has to be transported some 60 miles and transportation charges are very high. Last year we did 14,514 square yards of this squeegee coat at a cost of 6.9 cents per yard. The treatment gives a sandpaper finish. It was first used on a slippery road where several near accidents had occurred, and is still giving a perfect non-skid surface after three years. The change in appearance and wearing qualities of the penetration macadam after being treated with this coating was remarkable. When so treated it is fully the equal of the bituminous concrete surface. The street must be done from curb to curb to give a good appearing job. At first we did half the street and then came back and did the other half, but found a mark in the center where the two treatments met, so that to do a good looking job the street must be shut off. Incidentally, it is interesting to note that the maintenance of our roads, so far as resurfacing is concerned, cost $3,000 in 1941 as compared to a maximum of $18,000 in former years. This is due to improved methods and materials, mechanical devices and the conversion of over thirty per cent of our roads to a more permanent surface requiring less maintenance.

For constructing and maintaining its streets the borough owns the following equipment: Four Ford V-8 trucks, 85 hp, automatic dump body. Two Littleford tar wagons, one on pneumatic rubber wheels and one on steel wheels. One of each of the following: Ford V-8 truck, 95 hp, automatic dump. Chevrolet pick-up

Garbage Disposal by Grinding

WITH

PRACTICAL — SANITARY — EFFICIENT

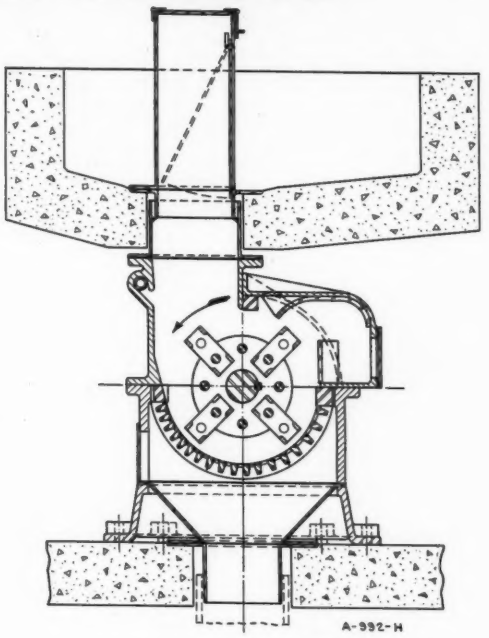
JEFFREY GRINDERS

The solution to garbage disposal in hundreds of army posts and camps.

Disposal by grinding with Jeffrey Grinders also the practice on hundreds of our warships.

Jeffrey Garbage Grinders eliminate many objectionable conditions heretofore experienced in other methods of garbage disposal.

Furnished with or without metal catcher (see drawing)



CRUSHER DIVISION

THE JEFFREY MANUFACTURING COMPANY

Established in 1877

947-99 NORTH FOURTH STREET **COLUMBUS, OHIO**

Baltimore Birmingham Boston Buffalo Chicago Cleveland Cincinnati Detroit Denver Harlan Houston Huntington Milwaukee New York Philadelphia Pittsburgh Scranton St. Louis Salt Lake City

JEFFREY MFG. CO., LTD. OF CANADA: MONTREAL

Flagstone curb being reset during road reconstruction. Concrete was poured under and back of it.

truck. Ford station wagon. Austin Western motor street sweeper. Rex one-bag concrete mixer. Rex half-bag mixer (used for bituminous concrete). Ransome one-bag mixer. Motorized tree sprayer. Meyers pump on Chevrolet truck. Worthington compressor on Chevrolet truck. Homelite 10,000 gph portable pump. Rex 15,000 gph portable pump. Jaeger 20,000 gph portable pump. Jacobson heavy-duty motor scythe with snow plow attachment. Buffalo 3-wheel 10-ton roller. Buffalo 2-wheel 6-ton roller. Caterpillar 15-ton bulldozer. Galion street grader. American high-speed snow plow. American push snow plow. Galion spreader for large stone. Good Roads spreader for grit and small stone. Street marker. We also have a Fairbanks-Morse portable pump for heavy sludge; a W&T portable chlorinator; a Stewart sewer cleaning apparatus with winches and cable; and a Flexible steel sewer rod equipment.

Our equipment is housed in a building with two compartments, one being 65′ x 54′ and the other 37′ x 27′ in size. The garage is a one-story building with a concrete floor, cinder block walls, and a flat roof with skylights. The larger of the two compartments is heated only by an automatic fan radiator, the other is completely heated. This contains a grease pit and all necessary equipment for repairs. In one corner of the garage is located a store room. One man, called the garage attendant, is continuously at the garage. He makes all minor repairs and in recent years has been making major repairs. He supplies all the equipment with gasoline, keeping a careful record. Each piece of equipment has a card, on which is kept its life history, mileage, gas used and so forth. If a piece of equipment is used on a job for 6 weeks or more it is taken to the garage and gone over for defects and necessary replacements. Large equipment such as road rollers are gone over completely once a year by the manufacturer. A major amount of the repair work is done in the winter time when the equipment is least used. An ample quantity of parts are now kept on hand, since it is so hard to get pieces in an emergency. A great deal of our equipment is rebuilt equipment, purchased second-hand during the height of our construction program.

Spring Maintenance of Streets in Bangor

(Continued from page 12)

or contract interpretations; and the contractors' profits can be used to expand the program.

The disadvantages might include the investment in equipment used only for this item of work (although this is small, as most of the equipment is used for other work); and the fact that there is no one to whom you can pass the buck in case of any complaint from the critical public.

Ten-Year Tests of High-Early-Strength Cement Concretes

Ten-year compressive-strength tests have now been completed on concretes made with 12 high-early-strength cements, for which the results up to 1 year were given in a report in 1935 (R.P. 799). The concretes were of three different cement-water (C/W) ratios, five initial temperature conditions, and four curing conditions.

The concretes stored in damp air generally continued to gain strength up to 10 years. Concretes stored in the air of the laboratory had about the same strengths at 10 years as at 28 days. The strengths at ages after 28 days were not appreciably affected by the initial temperatures, which varied from 70° to 110°F. However, the usual variation in strength with C/W ratio persisted up to 10 years. For damp-cured 1:2:4 concrete of C/W ratio = 1.50 (7.5 gal. of water per 94 lb. bag of cement) the compressive strengths at 10 years were generally between 4,000 and 5,000 lb. per sq. in. For concrete of the same proportions, and a C/W ratio of 1.73 (6.5 gal. per bag), strengths of over 6,000 lb. per sq. in. were attained for 8 of the 12 cements.

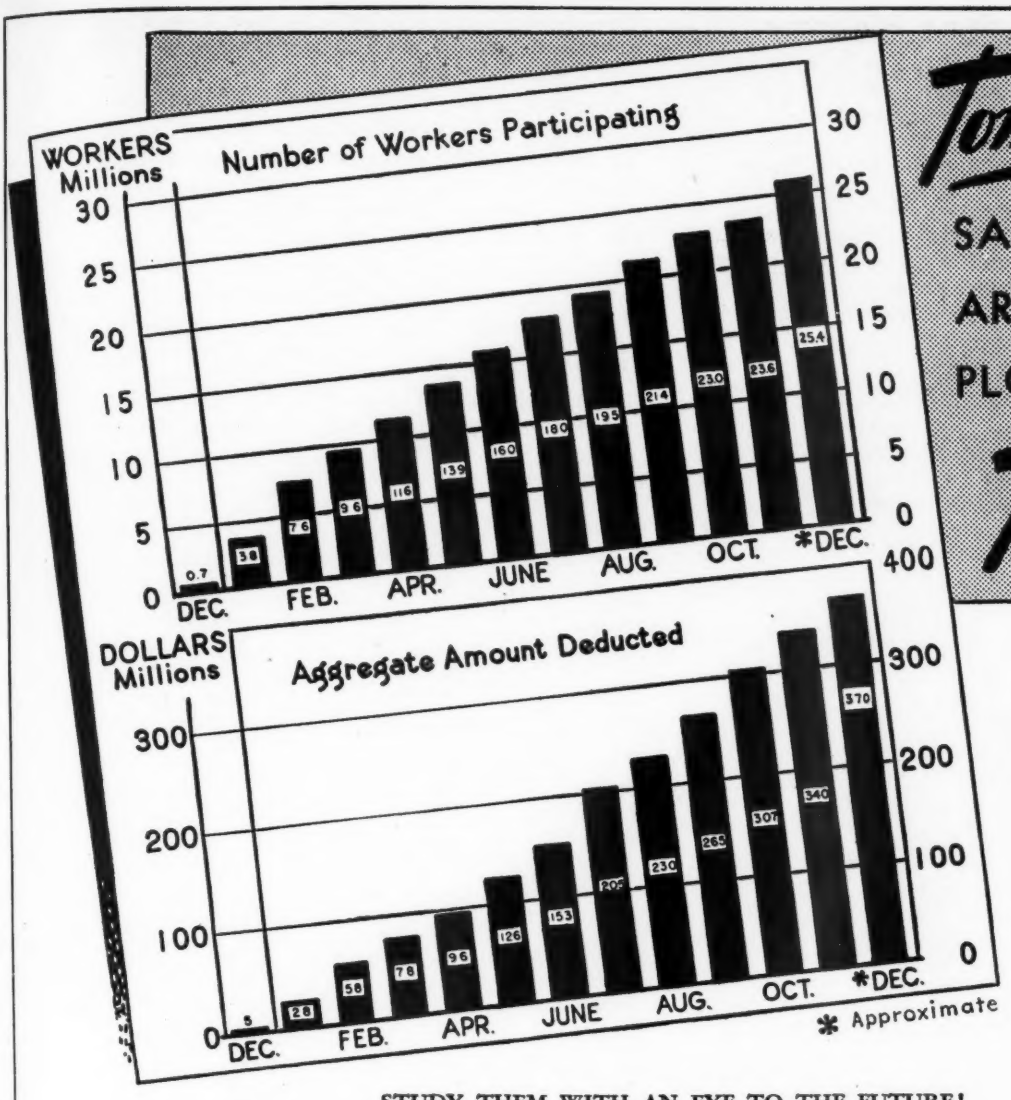
Present-day cements, even of the moderate-heat type, are shown to be capable of giving concrete strengths in 1 month at least equal to those for a 1910 cement at 10 years; present-day (1941) high-early-strength cements may give strengths at 1 month exceeding the 10-year strengths.

Abstract of article by Louis Shuman, Bureau of Standards, in "Journal of Research."

Youngstown Charges for Garbage Collection

Youngstown, Ohio, recently adopted an ordinance establishing a 50-cent monthly charge for collecting residential garbage. Window cards of three different colors, good for three months, six months, or one year, may be purchased by the householder at a cost amounting to $6.00 a year. Industrial waste collection is provided for in the ordinance, at a base rate of $1.15 monthly for 60 gallons, up to $3.50 for 180 gallons, and 25 cents more for each additional 30 gallons. Commercial collections not in excess of 30 gallons carry the domestic rate of 50 cents per month. The ordinance provides for the stringent control of garbage disposal by the householder who may elect to handle his own waste. A proposal to collect rubbish with city forces was also considered but no action was taken by the Youngstown council.

According to "Refuse Collection Practice" (Am. Public Works Assn.) there are some indications that the service charge method may be used more widely than in the past because of "the unquestioned success of cities using the method and the evidence that some of the former objections to the plan are being overcome."



Tomorrow's SALES CURVES ARE BEING PLOTTED . . . Today

THESE CHARTS SHOW ESTIMATED PARTICIPATION IN PAYROLL SAVINGS PLANS FOR WAR SAVINGS BONDS (*Members of Armed Forces Included Starting August 1942*)

STUDY THEM WITH AN EYE TO THE FUTURE!

There is more to these charts than meets the eye. Not seen, but clearly projected into the future, is the sales curve of tomorrow. Here is the thrilling story of over 25,000,000 American workers who are today voluntarily saving close to FOUR AND A HALF BILLION DOLLARS per year in War Bonds through the Payroll Savings Plan.

Think what this money will buy in the way of guns and tanks and planes for Victory today—*and mountains of brand new consumer goods tomorrow.* Remember, too, that War Bond money grows in value every year it is saved, until at maturity it returns $4 for every $3 invested!

Here indeed is a solid foundation for the peace-time business that will follow victory. At the same time, it is a real tribute to the voluntary American way of meeting emergencies that has seen us through every crisis in our history.

But there is still more to be done. As our armed forces continue to press the attack in all quarters of the globe, as war costs mount, so must the record of our savings keep pace.

Clearly, on charts like these, tomorrow's Victory —*and tomorrow's sales curves*—are being plotted today by 50,000,000 Americans who now hold WAR BONDS.

EVERYBODY EVERY PAYDAY AT LEAST 10%

Save with

War Savings Bonds

This space is a contribution to America's all-out war effort by

PUBLIC WORKS Magazine

When you need special information—consult the classified READER'S SERVICE DEPT., *pages 63-65*

Well-Worded State Highway Specifications

(Continued from the December issue)

Gunite or Pneumatically Placed Concrete

Description.—This item shall consist of preparing the surface to be covered, furnishing the materials, mixing and applying a coat of plain or reinforced gunite or pneumatically placed concrete, composed of Portland cement and sand, together with reinforcing steel, if shown on the plans. The thickness of the coat shall be that shown on the plans.

Materials.—Portland cement, sand and reinforcing steel specifications should be inserted or referred to.

Adjacent sheets of reinforcing mesh shall be lapped 6 inches and securely tied together. Water shall be free from sewage, oil, acid, strong alkalies, or vegetable matter and shall also be free from clay and loam.

Cleaning Surfaces.—The surfaces of all steel members to be covered must be thoroughly cleaned of all paint, rust, grease, dirt or other material before applying the gunite. On all old or new masonry, all loose or defective material shall first be removed and the surface thus exposed be thoroughly cleaned. The Contractor may be required to use a sand blast to clean any surface.

Mixing.—The materials shall be thoroughly mixed dry in a batch mixer. Before placing the mixture in the hopper of the cement gun, all material and lumps over ¼ inch in size shall be removed by screening.

Proportions.—The mixture as placed in the hopper shall be one volume of Portland cement and three volumes of sand, unless otherwise shown on the Plans or in the Special Provisions or Proposal.

Pressure.—Not less than 35 pounds pneumatic pressure per square inch at the cement gun shall be used in placing the mixed material. If more than 100 feet of hose or a greater lift than 25 feet is used the pressure must be increased proportionately. The water shall be maintained at a uniform pressure of not less than 25 pounds above the pressure of the air on the gauge at the cement gun.

Placing.—In "shooting" all surfaces, the stream of flowing material from the nozzle shall impinge as nearly as possible at right angles to the surface being covered. Any deposit of loose sand must be cut out. The Contractor shall do this work only with experienced men. No man operating the nozzle will be deemed as experienced unless he has previously placed gunite encasement on at least three bridges, or on other equally important work.

The thickness shall be maintained by "shooting strips," care being used to obtain full thickness of coating over thin edges of steel. In all cases, gunite shall produce true edges and plane or even surfaces.

On completion of a section of coating, all high spots shall be cut off with a sharp trowel, or screeded to a true plane as determined by the "shooting strips," and the entire surface unless otherwise specified on the Plans shall be given a flash coat, about ⅛ inch thick. Special care shall be taken to obtain a sightly appearance on all exposed surfaces. Where practicable, the gunite or pneumatically placed concrete shall be covered with burlap or cotton mats and kept wet for a week after placing, but where not practicable to use burlap or cotton mats it shall be kept wet by sprinkling for the same length of time. No gunite or pneumatically placed concrete may be placed when the air temperature is below 50° F. or against a surface in which there remains any frost.

Panelling shall be done in accordance with the Plans.

Method of Measurement.—The footage to be paid for shall be the actual number of square feet of surface covered with gunite or pneumatically placed concrete, of the specified thickness, in place, completed and accepted.

Basis of Payment.—The footage measured as provided above shall be paid for at the contract unit price per square foot bid for Gunite or Pneumatically Placed Concrete, which price and payment shall constitute full compensation for furnishing and preparing all materials, placing and finishing, and for all labor, equipment, tools and incidentals necessary to complete this item. *Adapted from Ohio Department of Highways.*

Right-of-Way and Project Markers

Description.—These items shall consist of constructing and erecting reinforced concrete right-of-way and project monuments of the sizes, dimensions and markings specified or directed, in accordance with these Specifications, at the locations shown on the Plans or designated by the Engineer.

Materials.—Markers shall be constructed of Class A concrete, reinforced as shown on the Plans. The materials used shall conform to the requirements stated elsewhere.

Construction.—The construction methods shall conform to the detail requirements stated elsewhere. The posts shall be cast monolithically in a vertical position. Lettering and numbering as shown on the Plans or designated by the Engineer shall be provided by the Contractor.

Erection.—Right-of-Way markers shall be erected at the following points unless otherwise directed:

1. At the ends of tangents.
2. At each corner of all offsets.

The markers shall be set in the ground to such depths as the Engineer directs. Right-of-Way Markers shall be set plumb with the lettered side facing the roadway. Right-of-Way Markers located in lawns, walkways or roadways shall be set with their tops 2 inches below the surface. Any marker damaged prior to final acceptance shall be replaced.

Project markers shall be set at locations at the right hand edge to the center line of roadway and in full view from the roadway.

All markers shall be set in stable, compacted soil on a firm foundation. The space around the marker shall be backfilled with selected approved material, rammed in place so that the monument when completed, will be rigid and secure in correct position.

After markers have been erected, any letters visible above the ground shall be painted with suitable black paint.

Method of Measurement.—The number of markers paid for will be the actual number ordered by the Engineer, completed and accepted.

Basis of Payment.—Accepted markers will be paid for at the respective contract unit prices bid for Right-of-Way Markers and Project Markers, complete in place, which shall be payment in full for furnishing, excavating, setting and backfilling and for all materials, tools, labor and equipment necessary to complete the work.—*Alabama State Highway Department.*

Wartime Maintenance of County Roads

Suggestions from Texas for making the most of limited finances, equipment and personnel.

By GEORGE W. GARRETT
District Engineer, Texas Highway Dept.

WITH our funds limited as never before, our equipment old and in need of repair, and most of our experienced personnel gone, what can we do to keep our county roads in repair?

First—we have perhaps half of our county mileage as Class A (use required every working day) and Class A seasonal. We have to maintain these roads to a higher type of riding surface than the others; therefore, it will require the best men and equipment that we have. How are we going to do this? Precinct 1 has all of his old experienced men, Precinct 2 has only 2 old experienced men, and Precincts 3 and 4 have 3 each remaining. Here is a thought that is going to make the eyes of some blink and start setting up mental reservations at once. Pool all of these men together under one foreman and turn the maintenance of these Class A roads over to this foreman. Subject to the orders of the commissioner in whose precinct he is working, work this crew on only Class A and Class A seasonal roads. Let the Commissioners' Court in executive session outline the general plan of operation of this crew so that there will be no conflict in the moving of this crew from one precinct to another.

Set up a central warehouse and shop for the storing and repairing of the equipment. This warehouse and shop does not have to be an elaborate affair. Take the best man that you have in the employ of the county and set him up as a general repairman and warehouseman. Keep all materials at this central warehouse. Emergency bridge lumber, nails, oil, gasoline, grease and repair parts must be provided. Most of these can be obtained through local dealers and such parts that have to be replaced most frequently should be kept on hand to an extent that the equipment would be idle only so long as necessary to make the repairs. The central warehouse and shop will save money. By setting up this central repair shop and warehouse the Commissioners' Court can buy for the entire county rather than for individual precincts. Purchase all of your supplies F.O.B. the warehouse.

If there is a local man skilled in welding, make a contract with him to do all of your welding. By letting this contract to one man he will become familiar with the county equipment and can soon learn what parts are subject to easy breakage and build these parts up before the next break appears. Make every operator responsible for greasing the equipment as often as recommended and changing the oil as frequently as recommended by the manufacturer. Also, have the operator report immediately any peculiar action of the equipment such as difficult shifting of gears, unusual noises about working parts, etc. There will be days when the weather conditions will not permit the operation of the equipment on the roads and these days can be used by the operators in checking and overhauling equipment. Preventive maintenance is worth 10 times as much as maintenance after the equipment is broken

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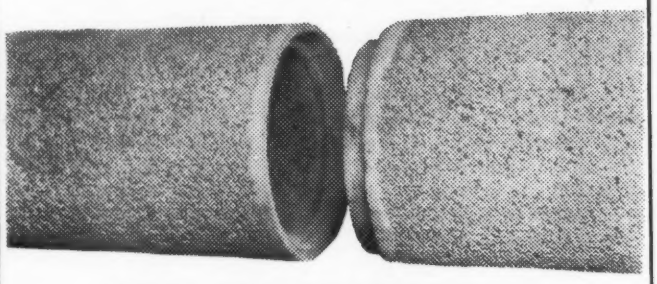

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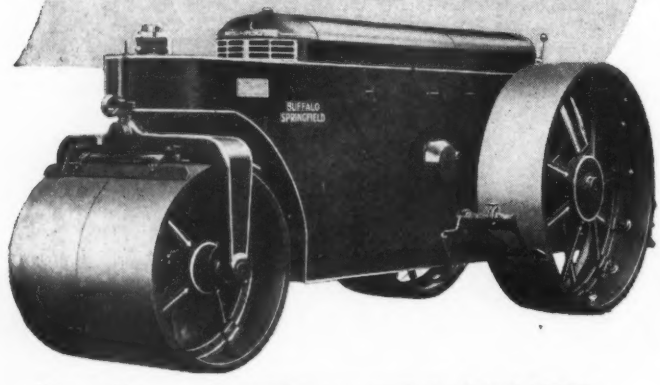

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and has to be repaired. There are many little details that we could discuss about things for the operator to do, but as a general recommendation, the operator should familiarize himself with all the literature that is furnished by the manufacturer of the equipment that he is operating and the equipment as recommended by the manufacturer. There are few counties that could not get together enough equipment and semi-skilled workmen that can be used to maintain the Class A roads.

On the Class B and C roads we will attack the maintenance problem a little differently.

These roads do not require as high a type maintenance as the Class A roads and therefore we can use less expensive equipment. To begin with, if each commissioner desires, he can use one of his old experienced men and one truck as a nucleus for the maintenance of the Class B and C roads. Then supply the remainder of the crew from local farm labor. How about other equipment for this crew? They would need only small tools, such as picks, shovels, axes, crowbars, saws, nails, hammers, etc. Use these men for making minor repairs to bridges, culverts, bad washes, bad ditches, etc. Now comes the backward step, so some may think, but really I believe it is a forward step. Let's build some old-fashioned drags of such type they can be pulled by a two-up team, a four-up team and farm tractor. Then have a farmer to drag a certain section of road. This section of road should not be longer than he could get properly dragged in one day, better in one-half day. Have a definite understanding as to when he is to drag the same. After each rain or not more frequently than so many weeks or at such time that he is to be notified. But at least have all of the farmers dragging on the same day on the same road so that maintenance will be connected. Some roads will not need dragging as frequently as others because of the difference in the amount of travel. Let the farmer know that he is having to pay the bill and try to get him to take a pride in maintaining the road alongside his property and his neighbor's property. In recent years there has been a tendency for lots of unnecessary travel. Get these farmers to talk up the idea of not getting out and starting to town as soon as it rains unless they really have business there. Each county commissioner has a responsibility in trying to keep down cost of maintenance of his roads. Impress on them the county wants to maintain the roads for essential travel and not domino travel.

Don't get the idea that you are going to work less. It will take more effort on the part of the county officials to keep this type of maintenance going successfully than the other type where we have largely left it up to the maintenance employees and have not been restricted because of men, material, and equipment. It will take long range planning and concentrated effort.

Here are some other ideas that I would like to pass on to you for your study. Where the county has a large number of timber bridges, it might be well to set up a small bridge crew just for the major maintenance of the bridges, the minor maintenance being taken care of by the other maintenance crews.

We are going to have to substitute timber for metal culverts and should have one or two of the maintenance crew trained in the building of wooden culverts. In order to make these bridges as long-lived as possible, we should treat the lumber with some kind of agent to make the lumber waterproof and prevent dry rot. Here is a simple method. Nearly all counties have abandoned cattle dipping vats. Purchase enough creosote oil to half fill one of these vats and soak the bridge

lumber in this creosote. If you cannot afford to buy the creosote, the next best thing is to collect the crank case drainings from the local filling stations and use this for the dipping vat solution. The crank case drainings are not as effective as the creosote but will prolong the life of the lumber several years and also reduce the tendency to splitting.

To make a two-up team drag, use two pieces of 3x12x8′ and connect them by placing one behind the other. Connect them by three 3x6x2′ pieces on three foot centers. Place one of the connections in the center and the other two at one foot from the end of the 3x12. The three by twelves should be operated with the 12 inch edge perpendicular to the roadway surface.

For a four-up team drag, or farm tractor drag, a very effective one can be constructed out of two 3x12 or 3x10—16 feet long. Use these for the sides. Connect the ends by using a 4x6—8′ in the front end and a 3x10—8 for the read end. For the blades use 3x10 or 3x12—6′ set at 30 degree angle with the side runners. It would require a minimum of two of these, better to use three. This type of drag will blade a road smoother than a maintainer whose working parts are loose and worn and cost about 1/3 as much to operate. The cutting edge can be provided by using old grader blades, or if they are not available, by using oak timber for the cross pieces. They will blade several months without having to be replaced. The runners will have a longer life if they are made of oak or faced with an old angle or channel irons that have been salvaged from old bridges.

East Texas is blessed with lots of oak, gum and pine. We should use this timber wherever we can as a substitute for steel in the construction of bridges. It may be that we will have to use wood pins instead of nails in some of our bridges, but it is my belief that the average maintenance man can rise to occasion and substitute whenever necessary.

As to personnel—it is my recommendation that you impress upon your men that they have a job that is absolutely essential to our war effort. The supplying of food, raw materials for clothing, timber, and other materials is dependent upon our transportation facilities. The origin of the larger percentage of these raw materials is not at the railroad switch nor adjacent to a paved state highway. The origin is in the rural sections served by the county roads or state farm roads, and do not let anybody kid you into thinking that it is not essential to keep these county and farm highways maintained. After your men are sold on the idea that they are contributing to the whipping of our enemies, they will be better workmen and quit looking for greener pastures in which to graze.

Should your regular equipment operator quit or be inducted into the armed forces, give one of your other employees a chance at running this piece of equipment. You may be surprised as to how good an operator you have been holding back.

If you get into serious trouble on a major problem, consult with your District Highway engineer. He will be glad to advise with you and give you benefit of his engineering training and years of experience on highway problems. This is a time when we all have to pull together to get the job done or go down trying to work at cross purposes.

The above is slightly condensed from an article in "Texas Parade," publication of the Texas Good Roads Association.

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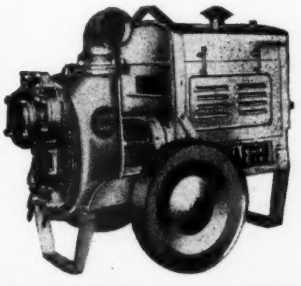

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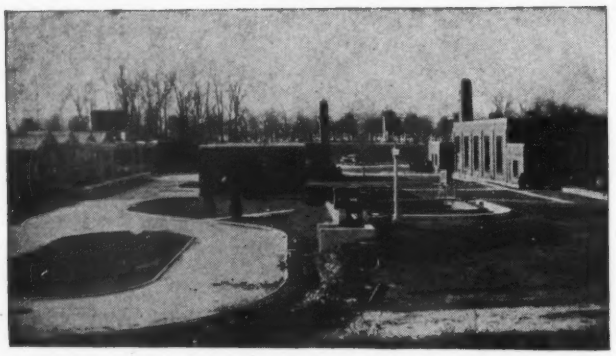


General view of Findlay, Ohio, plant. Main building at right; sludge beds and digester at left.

The Sewerage Digest

Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.

Pre-Treatment Of Acid Wastes

Industries discharging wastes into the Rahway Valley, New Jersey, plant in 1942 caused the pH to vary from hour to hour between 2.5 and 9.6. If sewages of high and low pH could be mixed it would greatly simplify the treatment problem. Practically no mixing occurred in flowing through 3,000 ft. of sewer. Retention for an hour in a tank caused material equalization, but not enough. High-calcium lime proved to be the most practical and economical material for neutralization. The plant adopted contained flash mixers, equalization basins and mixing tanks giving about one hour detention; with provision for recirculating through the equalization basin if one passage through does not sufficiently neutralize the acid wastes. A slurry of hydrated lime is added, varying with the pH values of the wastes, from 700 to 3,000 lb. per mil. gal. Effective neutralization is accomplished.[C13]

Nitrogen Changes In Anaerobic Digestion

During studies of the anaerobic digestion of human excreta, special experiments were devised to study the changes and losses of nitrogen. The results from these experiments are in perfect accordance with Waksman's theory that, for the limited conditions in which no oxygen is present, nitrogen cannot be evolved as a gas unless it is present in the form of a nitrate or nitrite. When present in this form, however, a large percentage may break down into N_2, N_2O, and NO gases, and the remainder may be reduced to ammonia; the quantity of these gases evolved being equivalent only to the weight of the nitrate or nitrite present. During the digestion, 75% to 90% of the organic nitrogen is broken down into ammonia nitrogen; about 90 to 95% of the nitrate nitrogen is denitrified to N_2O or N_2 and the remainder reduced to ammonia nitrogen when sufficient food is present for the bacteria, this condition apparently requiring a ratio of available organic nitrogen to nitrate nitrogen greater than 1:6.[C14]

Wastes From Potato Dehydration

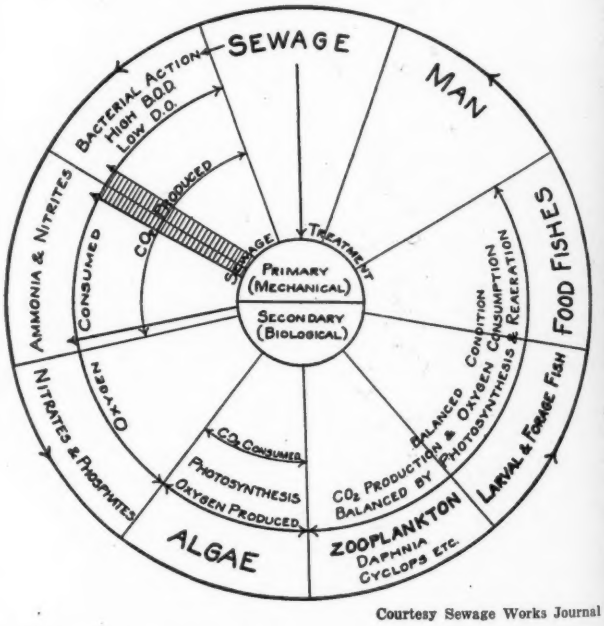
In 1942 about 25,000 tons of white potatoes were dehydrated for army use. This consists of removing the skin by abrasion, and remaining bits of skin and eyes by manual trimming; cutting into small pieces; washing; steam blanching; and drying. About 20% of the initial weight of the potato is removed. Other methods, such as flame peeling and lye peeling, will probably be developed to reduce peeling losses to 10% or less. The abrasive wastes are removed by water, which then contains about 18,000 ppm of suspended solids, of which about 30% is removed by screening through a 60-mesh. Of the settleable solids, 80% is removable by screening and 90% by 10-min. settling. At a plant at Modesto, Calif., 28 tons daily capacity, the peeler wastes are screened through a 60-mesh shaker screen, the effluent mixed with the other waste water and pumped to one of seven sand beds 20 x 170 ft., one bed being used each day and dried six days. Here the surface water disappears in 6 hrs., and 30 hrs. later the moisture content has diminished to about 30%, when it is shoveled into carts and removed as garbage.[C15]

Treated Sewage Increases Fish Life

Data obtained from a pollution survey of the Ohio river basin clearly show that the decomposition products of domestic sewage and other putrescible organic matter increase the growth of plankton, which growth is reflected in an increase in the fish population.

Untreated or raw sewage, when in sufficient concentration, produces a toxic area below the sewer outlet. The region extends downstream for a variable distance, until the sewage is decomposed by bacteria. From this point the stream is benefited by the fertilizing action of the decomposition products.

When the sewage has received proper secondary treatment, the toxic or degradation zone does not exist and the entire stream will be benefited biologically by the available plant foods introduced.[C16]



Courtesy Sewage Works Journal

Food Cycle in a Polluted Stream. Sewage or other putrescible organic matter after entrance into a flowing stream is changed by bacterial action into ammonia and nitrites and finally into nitrates and phosphates. These latter compounds are assimilated by the algae and result in an increase in growth of these plants. The algae are consumed as food by the larger plankton, zooplankton, which in turn are eaten by fishes. Cross hatched area shows the condition of the effluent as it leaves the treatment plant. The effluent from a primary plant contains some ammonia and nitrites, but is still subject to bacterial action after disposition into the receiving stream. The degradation zone, of high bacterial action, high B.O.D. and low D.O., in the stream can be eliminated by passing the sewage through a complete or secondary treatment plant. Complete treatment converts much of the organic matter into nitrates and phosphates which become immediately available for plant growth resulting in an increased fish population.

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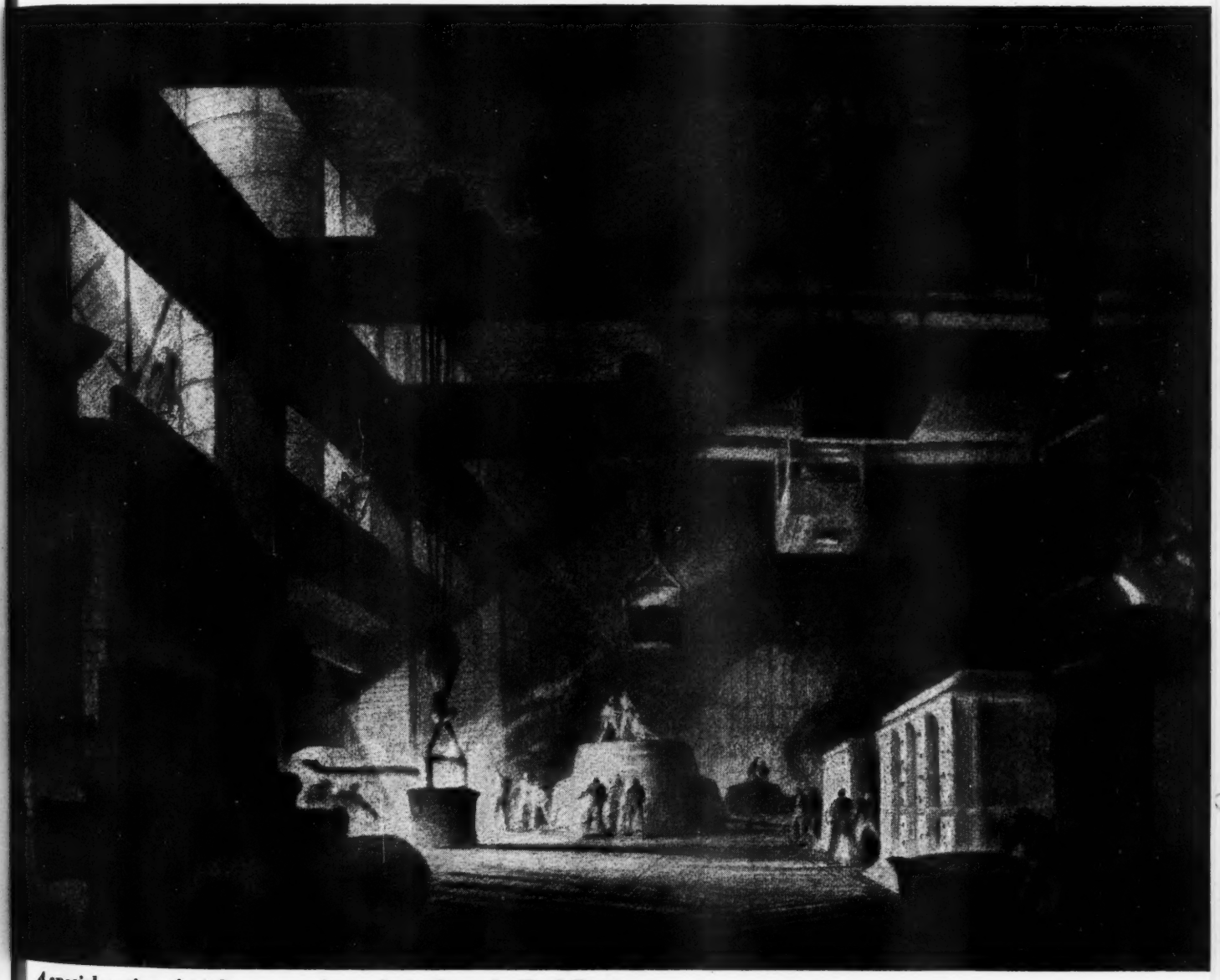

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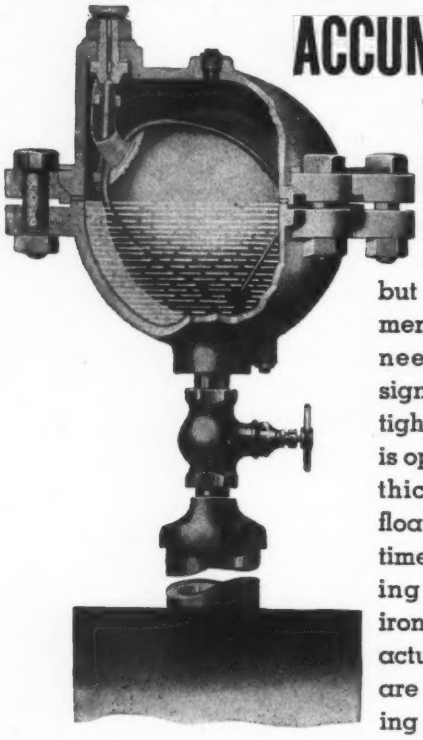

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Vacuum Filtration of Elutriated Sludge at Washington, D. C.

At the District of Columbia sewage treatment plant vacuum filters removed 6,862 tons of dry solids in the year 1940-41. Elutriation of primary digested sludge prior to vacuum filtration was found beneficial to the dewatering process and economically justified. The elutriation facilities include two air-agitated tanks for mixing digested sludge with river water or supernatant from the elutriation settling tanks. During a year of operation, ferric chloride used as a conditioner cost $8,500, but would have cost $17,000 more without elutriation. The total operating cost and fixed charges (interest at 3% and 20 yr. amortization) of elutriation were $5,984, showing a saving of $11,000 by elutriation, the plant for which cost $52,500.

In operating the vacuum filters, prompt and thorough washing of filters for 30 to 45 min. after every operating period is very important, to remove particulate matter that clogs the filter cloth. When filter cloths became clogged, washing with a 1% solution of oxalic acid at a cost of $2.50 per cloth added 30% to the service life, worth $35.

Filtering was shut down from Friday afternoon to Monday morning, and during summers fungus growths appeared on the cloths during this 2½ day rest. This was prevented by saturating the cloth with 100 ppm solution of copper sulfate. The average life of cloths was 408 hr; average cost, $115.[K3]

Filter Cloths at Minneapolis-St. Paul

Tests have demonstrated that there is a loss in filter yield of 2.5% for each 100 hr. of additional cloth life, when cloths were run 4 hr. between washings. With longer intervals between washings, the yield with low chemical dosages falls off rapidly for older cloths. The economical life is about 400 hr. with cloth costing 23.5 cts. per sq. yd. It is economical to give a cloth a bath in hydrochloric acid with an inhibitor after 350 hr. of service, increasing the economic life to 500-600 hr.

Intervals between washings have been reduced from 24 to 4 hr., which permitted material reduction in chemical quantities. Washing filters while in service, either continuously or at frequent intervals, is economical. Equipment for this consists of a wash-water pipe and nozzles installed immediately below the top edge of the take-off plate, washing the section of the drum between the take-off and the submergence in the sludge. This not only maintains a high filtering rate but also eliminates cutting out a filter for washing.

High filtration rates may be uneconomical because of the large amount of chemicals used. At this plant 8 to 10 lb. per sq. ft. per hr., using 3% of ferric chloride and 10% of lime, giving a cake thickness of 0.5 to 0.75 in., was distinctly uneconomical. Tests showed that the most economical filter rate is about 2 lb. per sq. ft. per hr., if including fixed charges, or 1 lb. based on operation and maintenance costs only. Increasing the number of filters at this plant from 6 to 7 would reduce operation and maintenance costs by $14 a day, paying for the additional filter in two or three years.[K4]

Relative Economy Of Vacuum Filtration

Sludge digestion and drying on sand beds is more advantageous than vacuum filtration for plants serving less than about 50,000 population. The reverse is generally true for populations exceeding about 200,000. For plants between these limits, decision should be based on a thorough analysis of many factors, including the type of treatment by which the sludge is produced. For the smaller plants the cost per ton of sludge for filtration and incineration is greater than for digestion and drying; the greater complexity of the former, from both mechanical and chemical standpoints, requires a higher quality of personnel for economical operation and maintenance; and there is less flexibility of operation—digestion pro-

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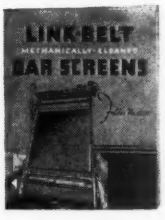

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vides a smoothing out of variations in both quantity and quality of sludge. The "complicated and numerous mechanical devices, even with proper care, display a persistent propensity to break down at the most inopportune times." But improvements in these devices and the rising standards of qualifications of small-plant operators will probably make the mechanical processes the more economical and dependable for even the smaller plants.[K4]

Sludge as a Soil Conditioner

Failure to use sewage sludge as a soil conditioner and fertilizer is waste of a natural resource. The use of raw primary sludge is not recommended because it is odorous, has a higher grease content than digested sludge and is not readily assimilated by the soil, tends to make the soil acid, industrial wastes in it may poison the soil, it may be a potential carrier of disease unless highly limed or heat-dried, and is not humified for soil use. The formation of humus before application to the soil is desirable.

In activated sludge both the content and availability of ammonia are much higher than in digested sludge. Heat drying frees it of harmful bacteria.

Primary digested sludge is valuable as a soil conditioner. About 50% dry weight may be humus, which is lacking in chemical fertilizers. A balanced fertilizer suitable for most soils is made by adding to 360 lb. of sludge (dry basis) 25 lb. of ammonium sulfate, 50 lb. of 20% acid phosphate and 15 lb. of muriate of potash. Lime should be added avery 3 or 4 years to check acidity. In southern California, in 1941, dairy manure sold for $1.50 a ton and digested sewage sludge for $7.00, due solely to their relative values.[K5]

Biology of Sprinkling Filters

A sprinkling filter teems with life—bacteria, fungi, algae, protozoa, nematoda, rotatoria, chaetopoda, crustacea, arachnida and insecta. Both the bacteria present and the fungi are stimulated by continuous aeration and use. Fungi are generally present in winter but scarce in summer. They hold the zoogleal film together as accumulation of solids increases in winter due to the inactivity of the bacteria; but when bacteria replace fungi in the spring, the fungal net weakens and sloughing occurs. The protozoa ingest bacteria and thus tend to keep young, active ones on the job.

Filter flies are probably beneficial, especially in the larvae stage, stabilizing the organic matter and accelerating the sloughing process. Flooding the bed for 24 to 36 hr. is the most successful method of control. It should be limited to 36 hr., and scouring velocities be avoided. Where flooding is impossible, gasoline torches, drying, repellant and contact insecticides have been tried with more or less success. The New Jersey Health Dept. finds chlorine doses over a short period helps.[C10]

Sludge Disposal At Buffalo, N. Y.

Buffalo's primary sludge is digested, vacuum filtered and incinerated. Operating expenditures for 1940-41 per million gallons (about 51 m.g. treated) averaged $1.33 for pumping, $0.70 for administrative expenses, $0.49 for laboratory, $1.00 for general sedimentation, $0.95 for chlorination, $1.86 for sludge disposal and heating, $1.20 for maintenance and repair, $0.62 for yards and grounds, and $0.09 for miscellaneous; a total of $8.24. The cost of solids disposal, including only direct costs and maintenance and repairs, was $7.07 per ton of raw solids disposed of.

Operating experience has led to the following developments: 1. Sludge tanks are valuable to take up irregularities in daily sludge quantities, to provide flexibility in operation of incinerators, and to supply gas for fuel. 2. In applying chemicals for sludge conditioning, manual

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have been replacing automatic devices, and arrangements adopted that permit the operator readily to observe rates of chemical application. 3. Canton flannel has proved the most satisfactory filter cloth. 4. A sludge-feeding device between filter and incinerator is useful but its economy is questionable. 5. Muriatic acid is satisfactory and economical for cleaning lime scale from filter screens and pipe lines. 6. The major problem in sludge drying and burning has been abrasion of equipment; but this may vary widely in severity at different plants, due to difference in sludge characteristics and nature of auxiliary fuel used. 7. Maintenance costs due to abrasion may be minimized by placing fans on the "clean air" side of cyclones, by using minimum speeds on moving parts and using concrete or ceramic linings instead of steel on stationary parts subjected to abrasion.[K2]

Kutter's *n* for Sewers Partly Filled

During extensive gaugings of sewage flows in Louisville, Ky., field determinations were made of velocities of flow and discharges in four sewers with depths of flow ranging from 0.03 D to 0.4 D. One sewer was inverted egg 18.33 x 27.50 ft.; one horseshoe 15.50 x 15.17 ft.; one horseshoe 6.50 x 6.13 ft; and one circular 2.00 ft. Conclusions were that higher values of *n* should be used for low flow than for greater depths; the values recommended for sewers with no obstructions being as follows: 0 to ⅛ full, 0.0140 to 0.0160; ⅛ to ¼ full, 0.0135 to 0.0155; ¼ to ½ full, 0.0130 to 0.0150; ½ full to full, 0.0125 to 0.0135.[K7]

In making the gaugings, velocities were measured by the dye-velocity and the salt-velocity methods. These were checked in one sewer by use of a Parshall measuring flume. This flume was used because it is practically free from clogging, operates with small loss of head, its accuracy is unaffected until the submerged flow reaches 70%, velocity of approach has little effect, it is adapted to use of an automatic recorder, is accurate within 3%, and is easy to construct. For small sewers, cipoletti weirs were used.[L2]

Pre-Aeration at Two Rivers, Wis.

An extended survey of the treatment plant at Two Rivers has been made, as a result of which it was concluded that pre-aeration of ordinary domestic sewage is not required if the sewage reaches the plant in a fresh condition, the primary tanks are of satisfactory design and properly operated, and the plant is not being forced to treat more sewage than it was designed for. The small increases in B.O.D. and suspended solids removals obtained by pre-aeration do not justify the use of the quantity of air involved.

At this plant the detention period in the pre-aeration tank averaged about 26 minutes. During these studies the air supply to this tank varied between 0.1 and 0.2 cu. ft. of free air per gallon of sewage.[H10]

Copper Wastes Affect Digestion

At Kenosha, Wis., low gas production was found to be due to copper in the rinse waters from a large copper and brass products plant. Bottom sludge in the digestion tank contained as much as 3,000 ppm copper. It was found that little digestion takes place if the copper content exceeds 200 ppm. Copper wastes were eliminated from the plant and in 30 days the gas production rose from 2,100 cfd to 7,000 cfd, in 60 days it was 20,000 cfd, and in 150 days it was 44,000 cfd.[H16]

Efficiency in Gas Production

By better heat insulation of digestion tanks, less gas need be used for heating them and more will be released

P.F.T. Rotary Distributors at Many War Plants

Modern sewage treatment plants are the rule in today's military and armament establishments. In many of these, P.F.T. Rotary Distributors are installed to spread the effluent uniformly on the filter beds, assuring maximum utilization of the filtering area.

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for power. The thermal conductance and surface transmittance of different materials are considered in designing the tank. A heat exchanger may be used to warm incoming sludge by heat from digested sludge. To improve the efficiency of existing tanks, the roof or side walls or both may be insulated, the capacity of the hot water circulating system or boiler capacity increased, or the amount of raw sludge pumped be decreased by thickening it.[G5]

Disintegration Of Trickling Filter Stone

Filters of the Elgin, Ill., Sanitary Dist. were filled 8 ft. deep with dolomitic limestone containing considerable silica, 47% calcium carbonate and 40% magnesia. No test of it for disintegration was made. In 3 yr. it began to disintegrate and by 13 yr. the entire surface was badly shaled and spalled, and later the stone was all removed, when it was found that disintegration had extended 12 to 14 in. deep and fine material clogged the remaining depth. Subjected to the standard sodium sulfate test, this stone failed after 6 cycles of the 20 required by the standard test. After screening, 60% of this stone was replaced in the bottom of the filters and the top 3 ft. was filled with new stone that withstood this test.[C17]

Bibliography of Sewerage Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; *n*, note or short article; *p*, paper before a society (complete or abstract); *t*, technical article.

C *Sewage Works Journal*
January

9. Shore Pollution Reduction at San Francisco. By Charles Gilman Hyde. Pp. 3-13.
10. The Biology of Sewage Sprinkling Filters. By R. H. Holtje. Pp. 14-29.
11. Genealogy of Modern Sewage Treatment. By John V. N. Dorr. Pp. 30-39.
12. Sewage Treatment Problems in Cleveland, O. By J. W. Ellms. Pp. 40-47.
13. Pretreatment of Acid Chemical Wastes. By Willem Rudolfs. Pp. 48-55.
14. *t.* Nitrogen Changes and Losses During Anaerobic Digestion. By J. R. Snell. Pp. 56-70.
15. Characteristics and Treatment of Potato Dehydration Wastes. By Harold Farnsworth Gray and Harvey F. Ludwig. Pp. 71-77.
16. Sewage, Algae and Fish. By Floyd J. Brinley. Pp. 78-83.
17. Rehabilitation of Trickling Filter Beds. By F. E. Johnson. Pp. 91-95.
18. Extracts from 1940 Report of Division of Sewage Disposal, Cleveland, O. By J. W. Ellms. Pp. 99-116.
19. Poliomyelitis and Sewage. By F. W. Mohlman. Pp. 122-124.

D *The Surveyor*
November 13

8. *p.* Extensions to York Sewage Disposal Works. By Donald Parker. Pp. 387-388.

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9. The Sedimentation of Sewage. Editorial. P. 429.
10. *p.* Continuous Flow Sedimentation in the Treatment of Sewage. By L. B. Escritt. Pp. 433-437.

E *Engineering News-Record*

January 28

3. Contact Aeration for Sewage Treatment. By Llewellyn B. Griffith. Pp. 60-64.

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4. Sanitation in Latin America. By Gordon M. Fair. Pp. 126-128.

G *Water Works & Sewerage*

January

5. The Design of Sludge Digesting Tanks for Efficient Gas Production. By Albert B. Kozma. Pp. 25-27.
6. Operating Log for a Small Sewage Plant. By A. A. Hirsch. Pp. 28-29.
7. *p.* The Oxidation Index in Activated Sludge Control. By Edward B. Mallory. Pp. 31-40.

H *Sewage Works Engineering*

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10. Studies on Activated Sludge at Two Rivers, Wis. By C. N. Sawyer, G. A. Rohlich and A. O. Tomek. Pp. 65-67.
11. Post-War Planning Conference Sees Bright Sanitation Future. Pp. 68-69.
12. Effect of War and Post-War on Sewage Treatment. By C. G. Gillespie, Warren J. Scott, Arthur D. Weston and N. M. DeJarnette. Pp. 70-73.
13. War-Time Construction Adds Over 645 Sewage Works. Pp. 76-85.
14. Gas Engine Saves Power at Bakersfield Plant. By Uno H. Erickson. Pp. 90-91.
15. Sewage Treatment Plants in U. S. A. Pp. 92-93.
16. War-Time Problems in Sewage Treatment. By H. T. Rudgal. Pp. 94-96.

J *American City*

February

5. Modern Sewage Plant for the Small Town. By James J. Corbalis, Jr. Pp. 40-41.

K *Proceedings, American Society of Civil Engineers*

January

2. Sludge Disposal Experiences at Buffalo, N. Y. By C. R. Velzy. Pp. 43-49.
3. Vacuum Filters Used in Primary Sludge Dewatering. By Ralph E. Fuhrman. Pp. 50-55.
4. Possible Economies in Sludge Disposal Practice. By George J. Schroepfer. Pp. 56-69.
5. Use of Sewage Sludge as Fertilizer. By LeRoy W. Van Kleeck. Pp. 70-79.
6. Experience of Chicago, Ill. in the Preparation of Fertilizer. By Wm. A. Dundas and C. P. McLaughlin. Pp. 80-102.

February

7. Determination of Kutter's *n* for Sewers Partly Filled. By C. Frank Johnson. Pp. 187-203.

L *Civil Engineering*

February

2. Gaging and Sampling Louisville's Sewage. By C. Frank Johnson. Pp. 97-100.

P *Public Works*

February

9. Eight Years' Operation of Princeton's Incinerator. By I. Russell Riker. Pp. 14-16, 40.
10. Sewage Treatment for Public Institutions. By Robert C. Wheeler. Pp. 17-18, 42.
11. Municipal Improvements for Large War Housing Projects in Norfolk and Portsmouth, Va. By Harry W. Alexander. Pp. 20-32.

Z *Journal, Missouri Water & Sewerage Conference*

January

1. Effects of War on Chemicals Used in Sewage Treatment. By Henry L. Dahm. Pp. 24-29.
2. The Historical Development of Sewage Treatment. By Geo. S. Russell. Pp. 33-39.
3. The Industrial Waste Problem at Springfield. By Geo. L. Loelkes. Pp. 40-41.

Recovery on Sewer Contractor's Bond for Property Damages

Where, under a sewer construction contract with a sanitary district, the contractor agreed to pay all damages for injury to property sustained by any property owner as the result of any act or omission by the contractor in the construction work, and the contractor's surety bond, by its terms, created an obligation by the contractor's surety for the benefit of any property owner whose property was damaged by the construction work, the sanitary district could maintain an action against the surety for the benefit of such property owner to recover the amount of a judgment which the property owner had recovered against the contractor. Because of the contractor's agreement in his contract to pay damages it was immaterial that the property owner's action against the contractor had been based on tort. Galesburg Sanitary District v. American Surety Co., 308 Ill. App. 457, 32 N. E. 2d 407.

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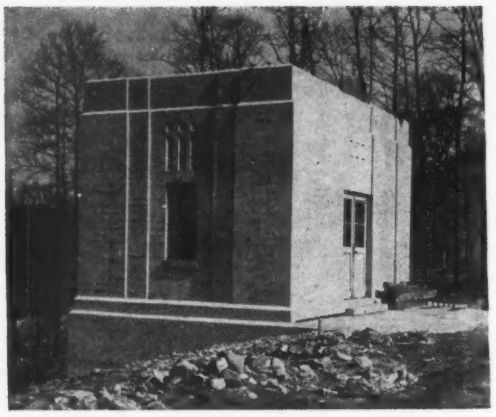


Gate house at sedimentation tank of Ashland, Ky., waterworks.

The Waterworks Digest

Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.

Inconveniences of Use of Emergency Alum

Use of the emergency "war alum" involves a number of inconveniences—more frequent cleaning of the alum-dissolving chamber; installation of a water eductor on solution lines, and of water jets in the dissolving chambers under some dry-feed machines; more dust in the alum; more frequent caking and arching in the hoppers; lumpy or caked alum under some weather conditions; and an increase of 10% or 15% in the amount of alum required. These are due chiefly to the greater amount of insoluble material in the new alum because of the greater amount of clay and silica in the type of bauxite which the WPB allocates for this purpose; and partly to the lack of experience of manufacturers in handling it, which lack should gradually be overcome.[A21*]

Waterworks Damages By War in Britain

Bomb fractures cause much greater damage to water mains than ordinary fractures and take about four times as long to repair—the larger the pipe the greater the ratio. Bomb craters may be any size up to 100 ft. diameter and may be full of water and debris. Gas and sewer pipes in the crater will probably be broken also; water may fill the gas pipes and sewage the water mains, but pollution by the latter has proved less than was expected. Bomb damage to reservoir embankments is less than was expected. Sabotage is a more serious threat than bombing to pumping stations, head works and aqueducts.

The most successful substitutes for lead or rubber in making bell joints in pipes has been a mixture, by volume, of 1 part rapid hardening cement, 3 parts clean sand and 4 parts yellow pine wood borings; after tightly yarning the joint, a stiff cement-and-sand mortar is tamped in place, then a layer of wood borings, another ring of mortar, more borings, repeated to within ½ in. of the face, finishing with mortar only. Such joints have stood 500 psi half an hour after completion.[A17*]

In sterilizing broken mains following a break, it is important to remove all sediment from the pipe invert, for it may be soaked with sewage and form a dense layer through which the sterilizing agent cannot pass.[A20*]

Substitute Materials In Waterworks Field

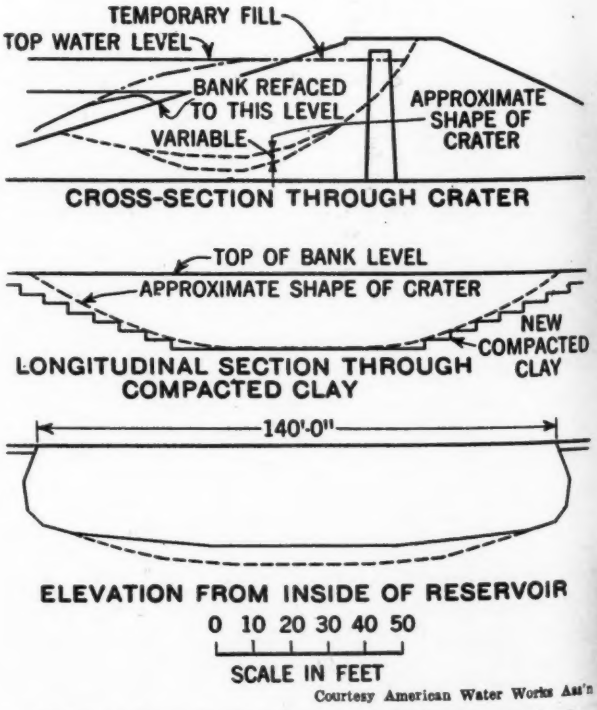
Where steel must be used, National Emergency Steels are used, which conserve critical alloys such as molybdenum, nickel, etc. Casting must generally be substituted for forgings. Plastics are available which are waterproof and will withstand high pressure, heat, alkalis and acids. Many "substitutes" may prove better than materials formerly in use.

Meters should no longer be scrapped because of high cost of overhauling. Cast iron cases are being used instead of bronze. Tin dipping, electro-tinning, chrome plating, monel metal, nickel alloys and stainless steel can not be used. Letting users read their own meters is being tried.

Services may be of cast iron with screwed joints for sizes of 1¼ inch and up. Lead is available up to 2 in., where pressures are not too high or water aggressive. Black steel up to 2½ in. is available; should be cement-lined for tuberculating water, tar coated and wrapped in corrosive soils. Wrought iron may be used if pH is high enough or CO_2 low enough. "Tube-Loy" is a lead alloy that resists higher pressures than lead; has been in service about 4 yr.; available in sizes up to 2 in. Plastic tubing is available up to 2 in. diameter; "Saran" seems to offer almost unlimited possibilities for water works.

Mains of asbestos-cement of small size are being used widely. Some centrifugally spun concrete pipe of 6", 9" and 12" diameter will resist pressures up to 100 psi. Vitrified clay pressure pipe is being used for pressure heads over 100 ft., with concrete encasement and short pieces of bell and spigot cast-iron pipe at the ends for making caulked joints and service taps; still in a stage of development. For bell and spigot joints, lead is available; portland cement has been used for years in mild climates. A paper product, "Fibrex" is used as an alternate for braided jute.

Other equipment. Satisfactory substitute materials have not been found for gate valves, hydrants, check valves,



Courtesy American Water Works Ass'n

Details of large crater in reservoir embankment in England.

*See Bibliography in February issue.

etc. High-grade cone valves are difficult to secure. Suitable pump impellers are now being made of cast iron. For pump repairs, metallizing should be used where possible. For wells, centrifugally spun concrete screens and casings are available in sizes up to 17 in. and for depths of 400 ft. Asbestos-cement pipe is particularly well suited for gravel-packed wells for both casings and screens up to 36 in. diameter. "Styrene" or "Vinyl" resins are suitable plastic materials for well casings and screens of small size.[A22*]

Recommended Water Sanitation Practice

The U. S. Public Health Service has prepared a Manual of Recommended Practice "limited to a comparatively brief and general description of those features of water supply systems and their operation which may be said to conform to accepted principles of good sanitation." It is divided into four parts: 1—Physical Features of Water Supply Systems and Their Sanitary Protection; 2—Sanitary Requirements for Water Treatment Systems; 3—General Sanitary Requirements for Water Distribution Systems; 4—Chemical and Bacteriological Requirements for the Revised Drinking Water Standards.

This Manual, occupying 24 pages of the AWWA Journal, can be obtained from the Superintendent of Documents, Washington, D. C.[A32]

Chromium in Water Supplies

Chromium is found in the ground water used for supplying Los Angeles, Calif., reaching it in wastes from chromium plating and oxide coating of aluminum by the anodizing process practiced by the aircraft industry. In six weeks last fall it increased in one well system from 0.05 ppm to 0.08. This gave the authorities concern, since one authority has stated that "For all anyone at present knows, amounts of chromium as low as 0.1 ppm may be physiologically harmful." Others have said that as little as 0.5-2.0 ppm in sewage affects the biological demand test and 10 ppm seriously interferes with the activated sludge process.

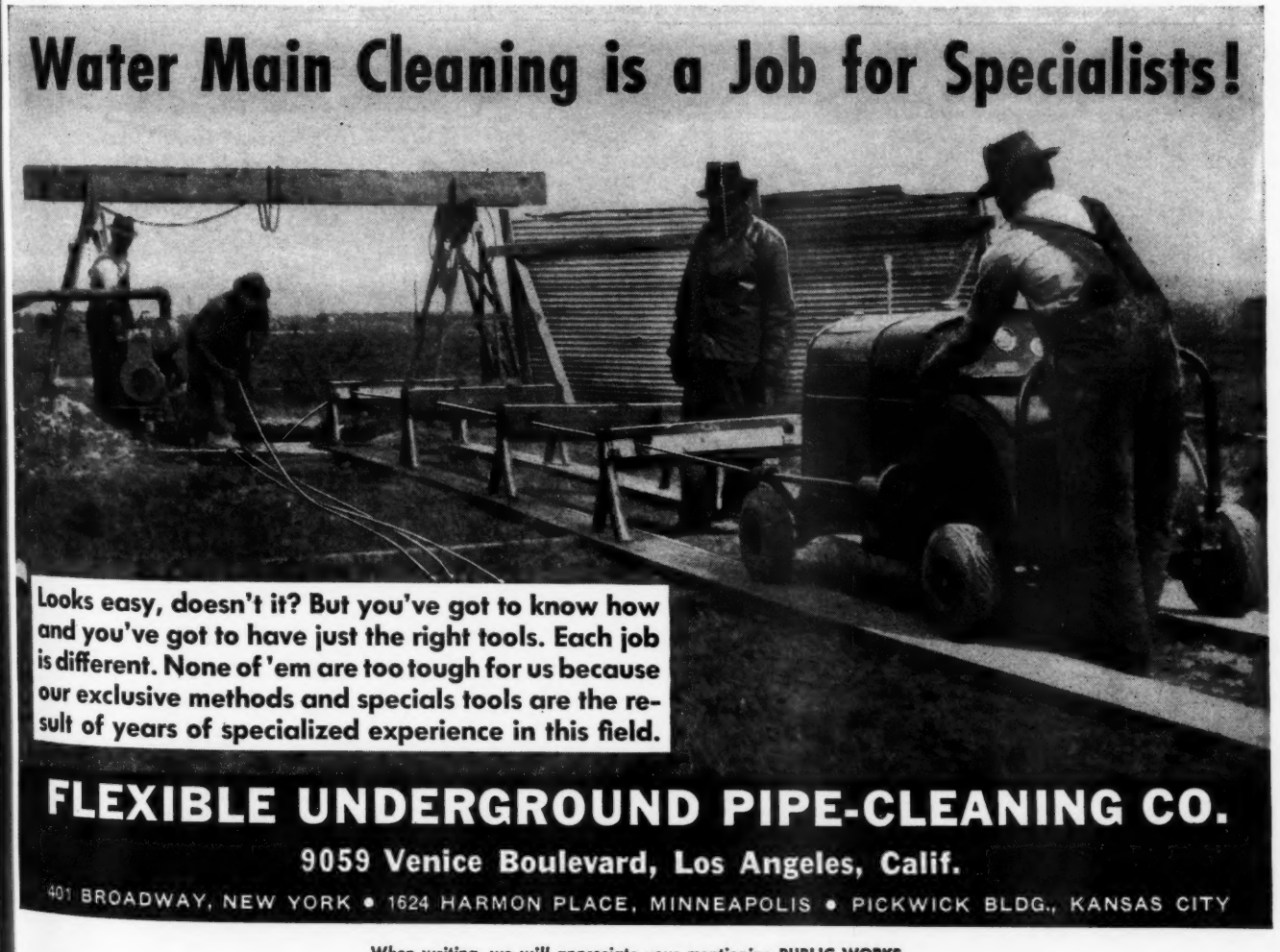
The remedy is to remove the chromium at its source, which can be effected by precipitation as either chromic hydroxide or barium chromate. The former is effected by acidification and precipitation with lime. The latter is more expensive and otherwise less desirable. The equipment, including compressed air agitation, is very simple. Analytical methods have been devised which in 5 minutes determine chromium to a sensitivity of 0.003 ppm.[A33]

Unsafe Drinking Fountains

Study of 12 bubbling drinking fountains, 9 of the angle-jet cabinet types and 3 of the vertical jet types, showed some to be more dangerous than the common drinking cup, the bowl being used as a cuspidor. It was believed that "drinking fountains can and do serve as intermediary links in the epidemiological pattern, user-to-fountain-to-user." [A34]

A Plan for Main Sterilization

In some cases it is desirable to continue the use of the mains during the period of sterilization, limit the waste of water and use of sterilizing agents. In laying 11 miles of extensions in the New York Navy Yard a method was developed, a concise outline of which is: Flush the mains thoroughly for 1 hr. Introduce chlorine to produce free chlorine residuals of 0.5 to 2.0 ppm beyond the break point, continuing this for 24 hr. Repeat the process until all post-chlorination samples meet USPHS standards for potability. Samples are taken at key points for



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bacteriological and chlorine determinations before and during chlorination and ½, 1, 2, 4, 8-10, 24 and 48 hr. after termination of chlorination. During the treatment, water is used for all purposes except drinking, and is potable in one to two weeks.[A35]

Water Conservation In Philadelphia, Pa.

The maximum summertime demand of Philadelphia at times before 1942 reached 400 mgd, which is the capacity of the plant. It was estimated that with increased population and industrial use it would far exceed this in 1942, but it was impossible to increase the supply. Conservation was the only answer, and the city put it up to the consumers to use no more water than they needed, repair all leaking plumbing, curtail garden and lawn sprinkling, and develop the habit of water watchfulness. A campaign was conducted through the press, radio, civic organizations and civilian defense agencies. As a result, last summer the demand averaged 20 mgd less than the previous year, instead of 40 mgd more, which it was estimated would otherwise be demanded—a conservation of 60 mgd, or 15%.[A36]

Pressure Grouting Well Casings

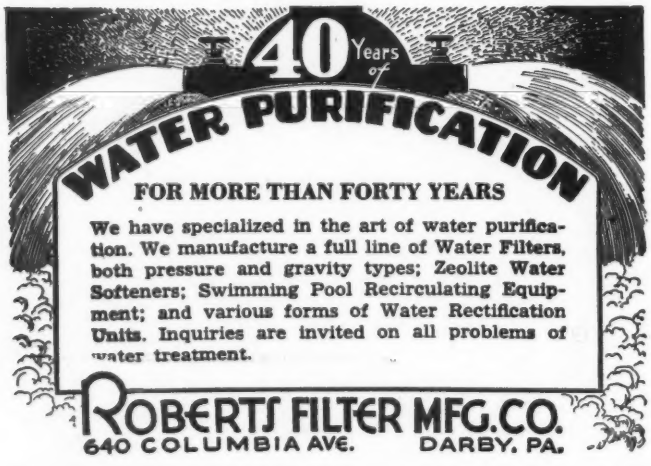
About two years ago the Missouri Board of Health adopted the practice of sealing well casings by pressure grouting, believing this to be the only satisfactory method. For this purpose the diameter of the drill hole from ground surface to casing point should be at least 4" greater than the nominal diameter of the casing. Water is circulated down through the casing and up through the annular space between casing and ground. If water escapes through pores or openings in the soil, these are sealed with some gelatinous material. Then cement grout is pumped in continuously until it rises to the surface and pressure maintained until it has set. Such a seal prevents entrance of impurities, migration of water from one stratum to another, corrosion of casing by ground water, and bursting of it if well is ever shot.[Z1]

Meters in New Bedford, Mass.

The water pumped to the reservoir (and pump slippage) is measured by means of a 9 ft. weir at the reservoir; also by a 16 x 4 in. venturi meter. There are 17,430 meters of ⅝ in. to 8 in., the 1 in. and smaller scheduled to be tested at 10-yr. intervals, the larger ones at 5-yr. intervals. The smaller meters, after 15 yr. of uninterrupted service, tested fairly well on ½ in. and ¼ in. streams but not on 1/16 in. Those not registering within 2% of accuracy are cleaned, or repaired if necessary. Iron cases are usually unfit for repair but composition cases are usually easily repaired unless frozen or otherwise deformed. Of about 1,500 small meters repaired in 1941, the average run had been for 15 to 20 yr. and registration 50,000 to 150,000 cu. ft.; average cost of repairs to a meter during its life about $6. Of about 400 large meters tested the average under-registration was about 10%.[F20]

Up-Flow Type Clarification Basins

The St. Louis County Water Co. for 1½ yr. ran a pilot plant to test the accelerated up-flow type basins, installing a "Precipitator," a "Hydro-Treator" and an "Accelator." It was concluded that these "seem to be particularly advantageous as softening basins when operated with heavy retained slurry concentrations. They seem to function best with relatively clear waters. The up-flow units can also be very successfully used for simple clarification purposes. In many instances a lower first cost may easily offset any increased coagulant costs required in operation."[Z2]



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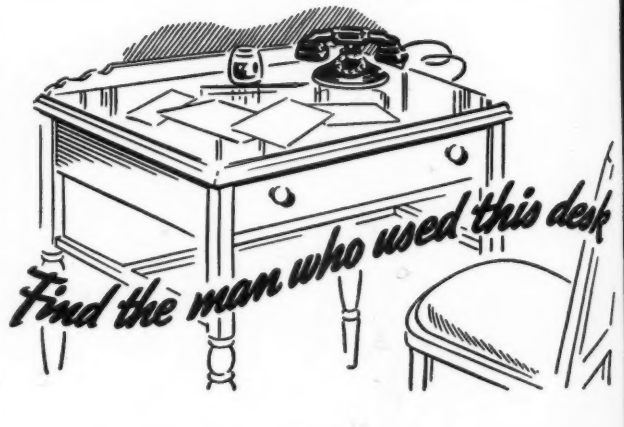

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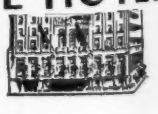

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Bibliography of Waterworks Literature

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A *Journal, American Water Works Ass'n.*
February

32. Manual of Recommended Water Sanitation Practice Accompanying United States Public Health Service Drinking Water Standards, 1942. Prepared by Technical Subcommittee. Pp. 135-158.
33. Chromium—A Water and Sewage Problem. By D. W. Graham. Pp. 159-164.
34. Bubbling Drinking Fountains. By Arthur Parker Hitchens and Oscar A. Ross. Pp. 165-167.
35. Proposed Plan for Water Main Sterilization. By A. N. Heller. Pp. 168-172.
36. Water Conservation in Wartime. Round-table discussion by James H. Allen, R. C. Beckett, H. T. Critchlow, R. I. Dodd and M. J. McLaughlin. Pp. 173-180.
37. Water Supply Development for the Army. By Frank V. Ragsdale. Pp. 181-182.
38. Organization and Activities of the Sub-committee on Water Supply of the California State Council of Defense. By Charles Gilman Hyde, Harry Reinhardt and Murray R. MacKall. Pp. 183-195.
39. Wartime Activities of the Bureau of Sanitary Engineering of the Florida State Board of Health. By J. B. Miller. Pp. 196-198.
40. Training of Water Works Personnel Under the E.S.M.W.T. Program. By N. C. Ebanglo. Pp. 199-200.
41. Mutual Aid in New York During 1942. By Earl Devendorf. Pp. 201-222.
42. Public Water Supply Defense in North Carolina. By Warren H. Booker. Pp. 223-226.
43. The Mutual Aid Plan in Indiana. By Louis A. Geupel. Pp. 227-231.
44. The Civilian Defense Program in Virginia. By J. H. Wyse. Pp. 232-234.

B *Journal, New England Water Works Ass'n.*
December

1. Rainfall in New England. By George V. White. Pp. 405-502.

D *The Surveyor*
January 15

2. Water Supply Literature in 1942. Pp. 25-26.
3. *p.* Water Supply Problems in War Time. By S. H. W. Middleton. P. 29.

F *Water Works Engineering*
January 27

17. Practices in Use at Flint, Mich. By Nathan N. Wolpert. Pp. 54-56.
18. Training Volunteers for Water Emergency Work. By J. McClure Wardle. Pp. 59-60, 125.
19. Water Treatment Plants in the U. S. Pp. 65-117.

February 10

20. Making Meters Behave. By H. C. Mandell. Pp. 148-151.
21. Effects of Changes in Water Quality in New York City. By Frank E. Hale. Pp. 152-156, 168.
22. Treatment Plants (F 19) Summarized. Pp. 157-160.
23. Postwar Water Works Will Need Hundreds of Millions. Pp. 161, 172.

G *Water Works & Sewerage*
January

10. Developments of the Year in Water Supply. By W. Victor Weir. Pp. 1-13.
11. How Metering Saved a Major Capital Expenditure. By Gerald F. Sheehe. Pp. 14-16.

J *American City*
February

5. New Pumps Pump Back Their Cost. Pp. 54-55.

M *Water and Sewage*
February

4. Comparison of the New Canadian and U. S. Water Quality Standards. By Norman J. Howard. Pp. 9-11, 34.
5. Water Storage Tanks Built of Wood. By Holman Harvey. Pp. 12-13.
6. How Bentonite Clay Stops Leaks in Reservoirs. Pp. 14-15.

P *Public Works*
February

10. Overcoming a Bloodworm (Chironomid) Problem. By J. C. Richards. Pp. 11-12, 38.
11. Municipal Improvements for Large War Housing Projects in Norfolk and Portsmouth, Va. By Harry W. Alexander. Pp. 20-32.
12. Changing From Artesian to Deep Well Service. By L. F. Wertz. Pp. 34, 36, 38.
13. Census Data on Water Treatment Plants. P. 41.

V *Journal, Maine Water Utilities Ass'n.*
January

1. Relationship of the Water Utility to Civilian Defense. By J. Elliott Hale. Pp. 12-17.

Z *Journal, Missouri Water & Sewerage Conference*
January

1. Pressure Grouting of Well Casings in Missouri. By L. E. Ordelheide. Pp. 8-10.
2. Experiences With Up-Flow Type Basins. By H. O. Hartung. Pp. 11-15.
3. Emergency War Repairs for the Water System. By D. W. Johnson. Pp. 16-23.
4. Effects of War on Chemicals Used in Water and Sewage Treatment. By Henry L. Dahm. Pp. 24-29.
5. New Developments in Determination of High Chlorine Residuals. By Roger C. Higgins. Pp. 30-32.

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HOTEL PHILADELPHIAN

Entirely redecorated and refurnished, including a radio in every room. Highly recommended by experienced travelers the world over for its warm hospitality; its excellent cuisine served in comfortably air-conditioned restaurants; its convenient location to the business section; and its unlimited parking facilities.

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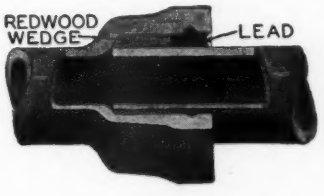
DANIEL CRAWFORD Jr., President and General Manager
39th and Chestnut Streets, Philadelphia, Pennsylvania

Simply

"SOCKET THE SPIGOT and CALK"

Untrained men can lay mains with McWane PRECALKED pipe before lead can be melted for pouring B&S joints.

The joint materials—pure lead and California Redwood wedges—are shipped in the pipe bell. No lead melting and pouring—pipe and joint are one. Cost? Only a few *pennies* more per foot than substitute pipe.



Sizes 1¼" through 12".

IMMEDIATE SHIPMENT

McWANE CAST IRON PIPE CO.
BIRMINGHAM, ALA.

McWANE 2" CAST IRON PIPE

Keeping Up With New Equipment

Evercrete for Waterproofing and Dustproofing Concrete

Evercrete Corporation
19 West 44th St., New York, N. Y.

It is claimed that Evercrete, a clear liquid chemical, impregnates and waterproofs concrete and brick, filling the pores, preventing disintegration and producing a hard wear-resisting dustless surface; it is impervious to acids and grease and is absolutely odorless; no skill is required to apply with a brush, spray or mop. One gallon covers from 200 to 400 square feet, depending on porosity; cost is about the same as paint. Will not blister, peel or crack.

This compound can be applied over a damp or dry surface, inside or outside. When dry it can be painted, if desired, and you will not get any hot spots or burning back of lime from the underside of the paint. Evercrete can also be applied over surfaces that have already been painted.

Another new product is Kleencrete. It is claimed to penetrate beneath the surface of concrete, brick and tile removing oil, grease and dirt and sealing the surface pores thus preventing dust and future penetration of stains and greases. Descriptive folders available on request.

Vitrified Clay Septic Tanks

Robinson Clay Product Co.
Akron, Ohio

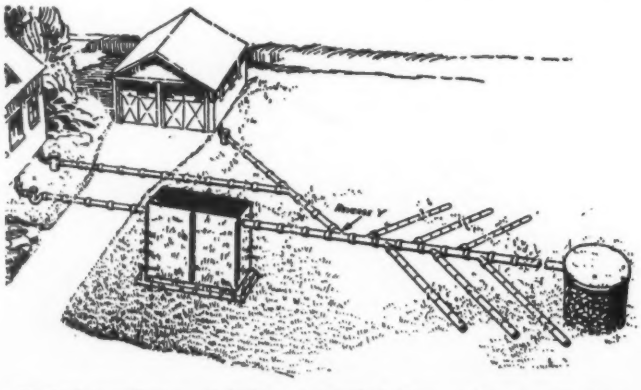
The manufacturers say they have a new, modern design Septic Tank made of Salt-Glazed Vitrified Clay which makes it possible for the entire system to operate as one unit because of the unique location of the openings between each section. This important feature, plus the length of flow which is possible within the tank, assures complete disintegration of the solids and a purer effluent.

Because of the special arrangement of the new tank there is easy access to each section which is convenient for cleanout purposes.

And they provide ample capacities for all types of installations, without the use of connecting pipes. The tank does not operate as a battery-type system, or as separate tanks in series, but as one unit.

These absorptive trenches are constructed using 4 inch round farm drain tile in one foot lengths, laid on a uniform grade of one inch in 16 feet, on washed gravel ½ inch to one inch in size, the gravel having a depth under the drain tile of at least 6 inches. Each joint should be spaced ¼ to ½ inch apart and the joints covered with strips of tar paper or metal tile connectors. After this is in place, sufficient gravel should be added to cover the top of the pipe. Parallel trenches should be not less than 6 feet apart from center to center. The entire trench shall then be covered with running strip of tar paper and backfilled.

A folder is available giving detailed instructions for installations, sizes, ratings and specifications. Write for it.



Typical installation of Robinson Vitrified Clay sanitary septic tanks.

Three Allis-Chalmers Men Move Up

Three important promotions have been announced by W. A. Roberts, manager of the Allis-Chalmers Tractor Division, involving changes in the company's sales and engineering organizations. They are:

(1) A. W. Van Hercke, from sales manager to assistant manager of the Tractor Division. He will coordinate all engineering and development work.

(2) A. F. McGraw, from sales promotion manager to general sales manager, heading up industrial and agricultural sales of the Tractor Division.

(3) R. A. Crosby of the advertising department, temporarily loaned to the Salvage Section of the WPB, will be advertising manager.

Mr. Crosby came to Allis-Chalmers with the Rumely Organization. He has been in the advertising department handling agricultural advertising, both

A. F. McGraw, Genl. Sales Mgr. Allis-Chalmers Tractor Div.

R. A. Crosby, Adv. Mgr. Allis-Chalmers Tractor Div.

space and literature. He has also been in charge of fairs, exhibits and other advertising functions for the company. His over-all experience suits him ideally for his new position.

New Aerator Line Announced in Four Bulletins

Pacific Flush Tank Co.
4241 Ravenswood Ave., Chicago, Ill.

The subjects covered are Pre-Aeration of Sewage and Grease Removal (Bulletin No. 140), Pretreatment of Laundry and Related Trade Wastes (Bulletin No. 141), Supernatant Treatment (Bulletin No. 142) and Supernatant Selectors for Digestion Tanks (Bulletin No. 143).

P.F.T. says "Atomizing" Aerator produces a suspension of finely divided liquid and solid particles in motion in a comparatively large volume of air.

Preaeration offers the advantages of accessibility, adaptability, freedom from difficulty, flexibility and quick results. (Bulletin No. 140—Pre-Aeration of

Sewage and Grease Removal). It is illustrated with charts and drawings, and describes extensive experimentation carried on in municipalities and army posts.

Particularly interesting to laundries, packing plants and similar agencies having trade wastes is No. 141—Pretreatment of Laundry and Related Trade Wastes. Atomizing Type Aerator can be successfully introduced for the reduction of grease content, suspended solids and BOD (Bio-chemical Oxygen Demand) to amounts that will not cause difficulties at the sanitary sewage treatment plant; how to dispose of supernatant liquor with the Atomizing type Aerator is shown in Bulletin No. 142; Bulletin No. 143 describes the Supernatant Selector for Digestion Tanks. Among the advantages claimed are that (1) the best supernatant liquor can be removed from any type of digestion tank; (2) Supernatant liquor can be removed at a slow continuous rate requiring minimum observation and manual control.

Write the Pacific Flush-Tank Company for these informative tracts.

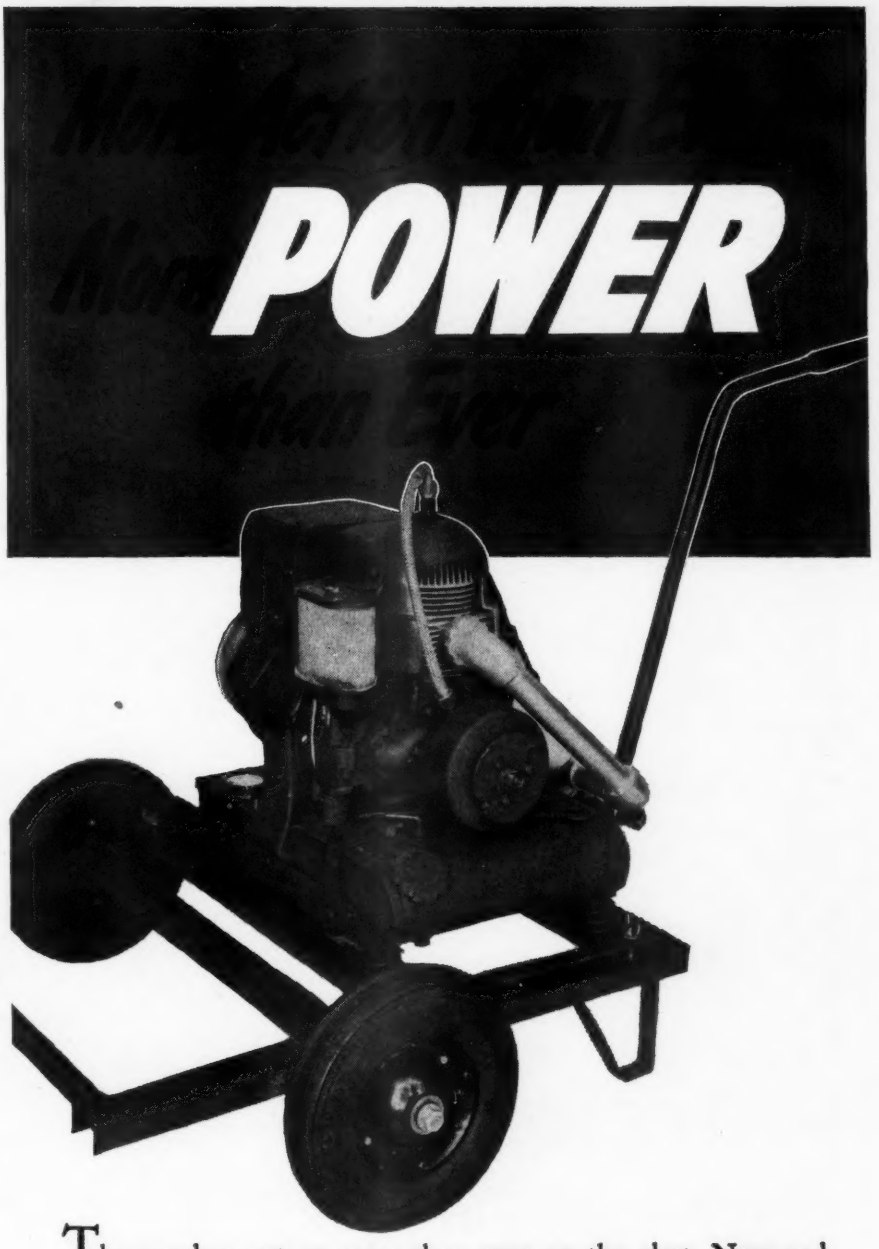
Presentation of Army-Navy "E" to Wallace & Tiernan Companies.

Unusual Dual Award of Army-Navy "E" Is Made to Wallace & Tiernan Companies

Pictured above are Colonel Harry A. Kuhn, Chief, Control Division of the Chemical Warfare Service, who conferred the "E" Award on the men and women of Wallace & Tiernan Products Inc., Mr. Charles F. Wallace, Vice-President and Mr. Martin F. Tiernan, President of Wallace & Tiernan Co. Inc., Lieutenant Colonel C. H. Shuey of the U. S. Marine Corps, who presented the "E" lapel insignia to representatives of both companies, Colonel J. S. Seybold, Chief of Procurement Section, Office of the Chief of Engineers, Washington, D. C., who presented the Award to Wallace & Tiernan Co. Inc., Mr. James Mills, who represented the employees in accepting the "E" pennant and lapel insignia.

Other Army and Navy "E" Awards

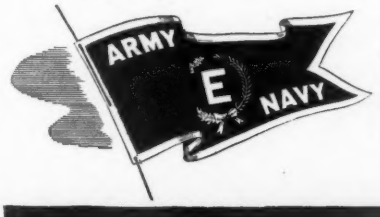
To the plants of Fairbanks Morse & Co. at Beloit, Wis., Freeport, Ill., and Three Rivers, Mich.—equipment built at these plants is used by the Navy, Army, Coast Guard, Maritime Commission, Air Corps, and for lend-lease to the United Nations; to the Springfield Tractor Plant of Allis-Chalmers Mfg. Co.—this plant builds 2-Cycle Diesel tractors; to R. G. LeTourneau,



The war has got us more than ever on the alert. New and better Homelite Generators—more portable, more powerful than ever—are daily rolling off our assembly line and going direct to our Armed Forces.

In design, in performance, and in the number of different units, Homelite has made tremendous forward strides. It doesn't mean much to you now—but after the war, your new Homelite Portable Pumps and Generators will be better performers than ever before.

★ ★ ★



Homelite workers have done their job well enough to earn the Army-Navy E—a good indication that they'll do their job well enough to meet your demands when peace is finally declared.

HOMELITE CORPORATION
PORT CHESTER, NEW YORK

Have You "Slacker" Sewers?

These are no days for reduced capacities, whether they be in men, machines, or sewers. If your sewerage system is making a half-hearted showing under war time overloads the answer may not be larger sewers or better sewers but better-performing sewers.

RESTORE WITH STEWART EQUIPMENT

Get the most out of what you have by cleaning with STEWART equipment. Restore them to full capacity and keep them that way. Whatever the job to be done, STEWART rods, tools, and other equipment can help you to do that—easily, speedily, and economically.

SEWER AND CONDUIT RODS

Just one item of the large STEWART line.
There's STEWART equipment for every need.

AVOID WASTE

Working without proper equipment is too wasteful for war time conditions. As the first step to speed-up, get the new complete STEWART catalog. Check your needs by it, then consult us about our various plans for increasing your sewer capacities. This is *saving* money, not spending it. Address, without obligation:

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P. O. BOX 767 SYRACUSE, N. Y.
"Since 1901"

Inc., Peoria, Ill., and Stockton, California, branches; to Irving Subway Grating Co., Long Island City, N. Y., on its Landing Mats for Flying Fortresses and other fighting planes; to Caterpillar Tractor Co., Peoria, Ill.

New Chemical Feeder Manufacturer

Chem-Feeds, Inc.
77 Reservoir Avenue, Providence, R. I.

Jeff Corydon, president, announces that the above firm will open its home office and assembly plant in March for manufacturing a new portable chemical feeder. This unit will weigh about 44 pounds, complete, packed in a protective case, and it is stated will contain the mechanism for a water main sterilization job or for chlorination of water supply for small military positions or groups of soldiers. Unique design features permit extension of capacity so that it will chlorinate water for several hundred men by a simple twist of a dial. Soda ash and other waterworks chemicals may also be fed by this Var-I-Feeder with "finger-tip" control of dosages.

Others associated with Mr. Corydon in the new enterprise are John V. Lizars, vice president and manager of New York office; Jonathan A. Chaffee, Jr., secretary and treasurer; and Henry N. Armbrust, technical director. The latter two will be located at the Providence office.

Buckeye Traction Ditcher Celebrates Fiftieth Birthday

Fifty years ago, the first Buckeye ditcher was completed in a tiny shop in Bowling Green, Ohio. James B. Hill, its designer and builder, thus became the founder of the Buckeye Traction Ditcher Company of Findlay, Ohio, a large and well known manufacturer of trenching machinery.

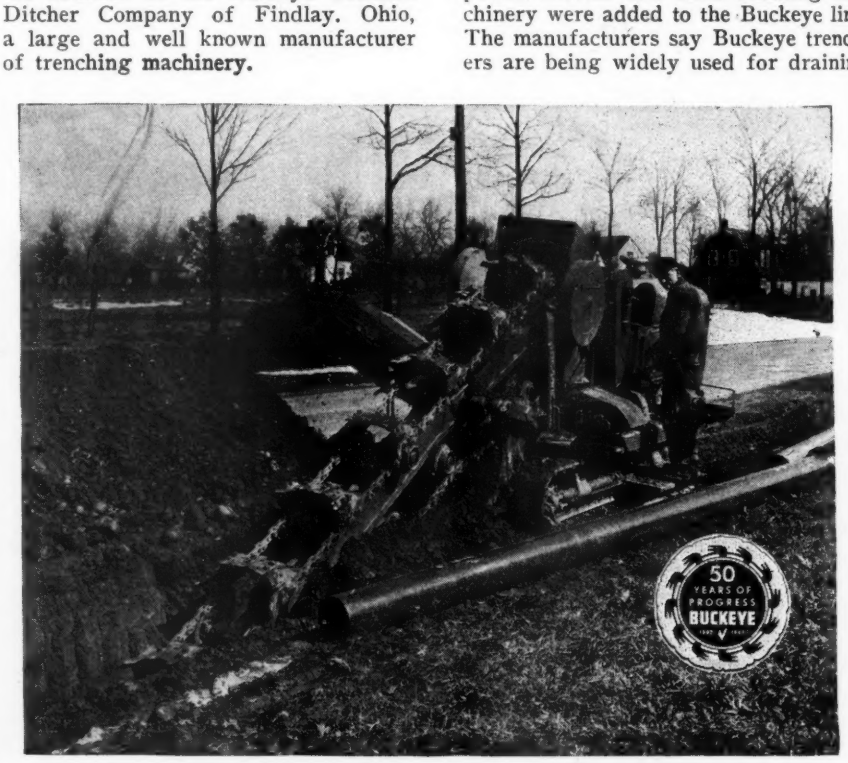
Jeff Corydon, President of Chem-Feeds, Inc.

The first Buckeye ditcher was of wheel type and built without engineering drawings or designs. Five more machines were built in Bowling Green; and then, following a receivership in 1898, the patterns were loaded into a wagon and hauled to Deshler, Ohio.

Five ditchers came off the Deshler assembly line, and then the plant was moved again—this time to Carey, Ohio. Twenty-five ditchers of various sizes were completed in Carey; and in 1901 Buckeye took up the trail once more, this time to Findlay.

Buckeye Ditcher was originally built for laying drain tile on farms, but soon demonstrated its value for digging trenches for many other purposes including trenching for water and sewer pipe.

After the development of the boom type trencher about fifteen years ago, power shovels and road building machinery were added to the Buckeye line. The manufacturers say Buckeye trenchers are being widely used for draining



Buckeye Model 410 Boom Type Trencher.

the locations for army camps, ordnance plants and naval bases—for installing cable underground.

Huber Speed Scoop.

Huber Speed Scoop

Huber Mfg. Co.
Marion, Ohio

Loading of the Speed Scoop is accomplished with an easy rolling movement of the earth which reduces drawbar pull. A simple hydraulic cylinder controls the scoop and its blade adjustment to the earth. The hydraulic ram action makes it possible to dump the dirt in one pile or spread it to any desired thickness. Backfilling, shouldering operations, dumping in odd corners or over embankments can be done with accuracy with the Huber Speed Scoop. Built in two sizes—for operation by one man with 20 to 30 h.p. tractors or 35 to 50 h.p. tractors.

The manufacturers say it is being used in many parts of the world for repairing bombed runways at landing fields and for quickly repairing highways affected by bombing attacks.

New Officers for American Water Works Association

The nominating committee has selected the following nominees: for President, Samuel B. Morris, School of Engineering, Stanford University; for Vice President, S. F. Newkirk, Jr., Engineer and Superintendent, Board of Water Commissioners, Elizabeth, N. J.; for Treasurer, William W. Brush, Editor, Water Works Engineering, New York, N. Y. If no other nominations are filed prior to March 1, 1943, these nominees will be considered elected and serve for the period beginning at the close of the 1943 General Conference and ending with the close of the 1944 Conference.

Conventions and Association Meetings

March 25-26—War Time Conference, N. J. Sewage Works Association, Hotel Tracy-Trent, Trenton, N. J.

April 7-9—Canadian Section American Water Works Association, Hamilton, Ontario.

May 7-8—Pacific Northwestern Section A.W.W.A., Bellington, Wash.

June 8-9—A joint War Time Conference of Pennsylvania Sewage Works Assn. and Pennsylvania Water Works Operators Assn. will be held at Penn Harris Hotel, Harrisburg, Pa.

June 15-16—American Water Works Assn., War Time Conference, Cleveland, Ohio.

NEW APPOINTMENTS

New City and County Officials recently reported:

City Engineers

Stanley Sweeney, Acting, Pensacola, Fla.
Virgil Lee, Anderson, Ind.
Paul A. Lytle, Columbus, Ind.
Jas. Nash, Connersville, Ind.
Paul Wagner, Crown Point, Ind.
Edwin M. Brady, Elkhart, Ind.
John D. Seright, Elwood, Ind.
Rudolph Meisinger, Evansville, Ind.
B. C. Woolley, Hammond, Ind.
William Earle, Hobart, Ind.
James Vernon, Huntington, Ind.
Lotus A. Warden, Kokomo, Ind.
Chester E. Zartman, Logansport, Ind.
Joseph Horner, Marion, Ind.
Donald C. Ford, Michigan City, Ind.
James L. Stevens, Mishawaka, Ind.
Harold K. Morrison, Muncie, Ind.
Ad. T. Jackson, New Albany, Ind.
Ernest L. Guyer, Newcastle, Ind.
Chas. Miles, North Vernon, Ind.
Earl E. Phillips, Peru, Ind.
Charles R. Mather, Seymour, Ind.
Clyde Yater, Shelbyville, Ind.
W. Robert Paige, Terre Haute, Ind.
A. F. Reinke, Vincennes, Ind.
R. M. Douglass, East McKeesport, Pa.
Wallace Hazlewood, Amarillo, Tex.

City Managers

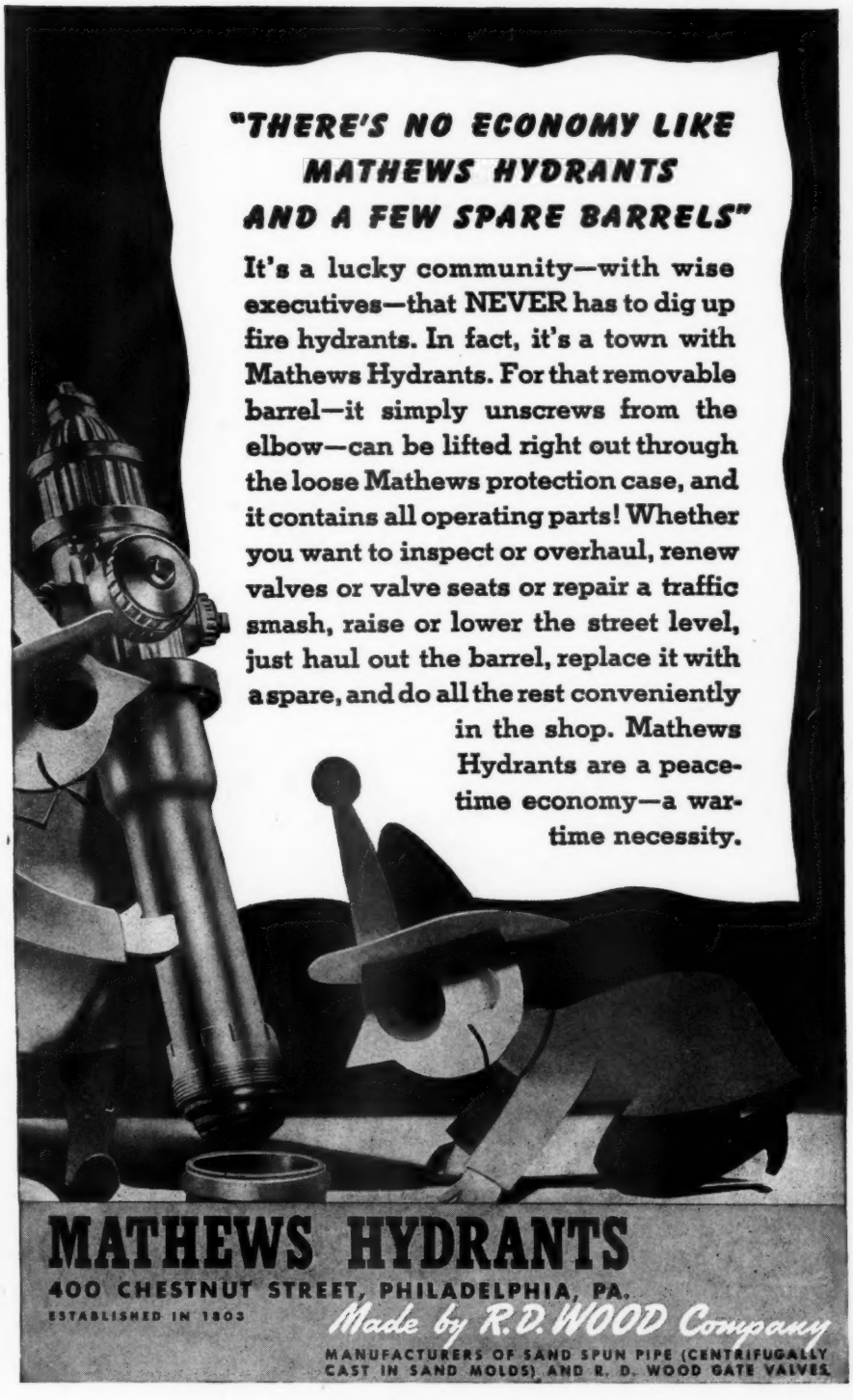
H. E. Bailey, Oklahoma City, Okla.
W. R. Woodbury, Williamsburg, Va.

Public Works Superintendent

C. W. Miller, Belle Fourche, S. D.

Water Works Superintendents

Fay Peer (Acting), Van Buren, Ark.
Harold L. Milnes, White Hall, Ill.
Raymond D. Gangwer, LaPorte, Ind.
Arthur M. Grass, Linton, Ind.
David Fields, Presque Isle, Me.
Romain Poyant, Acushnet, Mass.
Harry Myers, Paulsboro, N. J.
Walter Coulter, Newcomerstown, Ohio.
James N. Simpson, Bangor, Pa.



Jos. J. Plut, Millvale, Pa.
H. O. Horner, Shenandoah, Pa.
Whitfield Williams (Acting), Fredericksburg, Va.
Ben G. Davis, Rawlins, Wyo.

County Engineers and Officials

Joe A. Phillips, Poinsett Co., Harrisburg, Ark.
Amos Horn, Montgomery Co., Mount Ida, Ark.
Bert N. Paxton, Butte Co., Oroville, Calif.
Earle M. Rader, Dade Co., Miami, Fla.
Fenley Ryther, Bibb Co., Macon, Ga.
Glenn Allen, Franklin Co., Franklin, Idaho.
Sturman Hughey, Wabash Co., Mt. Carmel, Ill.
Troy Timm, Douglas Co., Tuscolo, Ill.
Clarence Windsor, Madison Co., Anderson, Ind.
Frank Lawrence, Rush Co., Arlington, Ind.
Virgil Buchanan, Lawrence Co., Bedford, Ind.
Harold Howell, Lawrence Co., Bedford, Ind.
Herbert Hudson, Greene Co., Bloomfield, Ind.
John J. Campbell, Monroe Co., Bloomington, Ind.
Robert L. McCormick, Clay Co., Brazil, Ind.
Earl O. Gilbert, Morgan Co., Brooklyn, Ind.
Ernest Kiefer, Jackson Co., Brownstown, Ind.
Russell Miller, Whitley Co., Columbia City, Ind.
Ken Jackson, Bartholomew Co., Columbus, Ind.
Stanley Phlanz, Harrison Co., Corydon, Ind.
Harry Sibert, Harrison Co., Corydon, Ind.
C. B. Campbell, Vermillion Co., Dana, Ind.
Harold E. Mason, Hendricks Co., Danville, Ind.
Charles W. Carr, Crawford Co., Eckerty, Ind.
Wm. Hitch, Vanderbergh Co., Evansville, Ind.
Edwin Nieter, Allen Co., Fort Wayne, Ind.
Emory Brattain, Putnam Co., Greencastle, Ind.
Frank Rothermel, Hanceck Co., Greenfield, Ind.
Clare M. Ray, Blackford Co., Hartford City, Ind.
Glen Brown, Huntington Co., Huntington, Ind.
Lessel L. Buzzard, Huntington Co., Huntington, Ind.
George L. Baker, Martin Co., Indian Springs, Ind.
James M. Plaskett, Clark Co., Jeffersonville, Ind.
Emmett Hoover, Grant Co., Jonesboro, Ind.
Omer Hook, Fulton Co., Kewanna, Ind.
Ezra Fay Lamb, Howard Co., Kokomo, Ind.
Fred Mohler, Franklin Co., Laurel, Ind.
Albert W. Karstetter, Dearborn Co., Lawrenceburg, Ind.
Charles A. Smith, Jefferson Co., Lexington, Ind.
Robert McGraw, Union Co., Liberty, Ind.
James D. McAtee, Martin Co., Loogootee, Ind.
Robert Harmon, Grant Co., Marion, Ind.
Harry Davis, Parke Co., Marshall, Ind.
Alpha Hoesel, Pulaski Co., Monterey, Ind.
Charles Schwartzkopf, Blackford Co., Montpelier, Ind.
Harry Bell, Brown Co., Morgantown, Ind.
Lester Janney, Delaware Co., Muncie, Ind.
Frederick H. Coleman, Fountain Co., Newtown, Ind.
William Banister, Jennings Co., North Vernon, Ind.
Mark Dedman, Gibson Co., Oakland, Ind.
Clarence Holmes, Orange Co., Paola, Ind.
Lloyd G. Crosley, Madison Co., Pendleton, Ind.
Harry M. White, Marshall Co., Plymouth, Ind.
Charles Haines, Wells Co., Poneta, Ind.
Earl Alberson, Jay Co., Portland, Ind.
Albert Sutter, Jasper Co., Rensselaer, Ind.
Lawrence Dodd, Ohio Co., Rising Sun, Ind.
Dale Zimmerman, Fulton Co., Rochester, Ind.
Heber Scamahorn, Spencer Co., Rockport, Ind.
Smith Martin, Washington Co., Salem, Ind.
Clyde Gunning, Shelby Co., Shelbyville, Ind.
Clement Fiwek, St. Joseph Co., South Bend, Ind.
Ben F. Otolski, St. Joseph Co., South Bend, Ind.
Wilber McMahn, Perry Co., Tell City, Ind.
A. N. Woolbridge, Tipton Co., Tipton, Ind.
Ora Scudder, Switzerland Co., Vevay, Ind.
Thomas Dunn, Knox Co., Vincennes, Ind.
Ben Winebrenner, Wabash Co., Wabash, Ind.
Thomas Stemply, Crawford Co., Wickliffe, Ind.
John Demmary, Warren Co., Williamsport, Ind.
Albert Raver, Green Co., Jefferson, Iowa.
A. L. Thomas, Harrison Co., Logan, Iowa.
Albert Reeves, Kingman Co., Kingman, Kan.
Joe Wolford, Lincoln Co., Lincoln, Kan.
Wm. E. Howe, Riley Co., Manhattan, Kan.
Hal L. Everett, Chautauqua Co., Sedan, Kan.
Dan S. Biohop, Carlisle Co., Bardwell, Ky.
R. O. Molierly, Madison Co., Richmond, Ky.
Norman R. Hess, Carroll Co., Westminster, Md.
Ernest Spencer, Alcona Co., Harrisville, Mich.
Geo. R. Boddie, Harrison Co., Gulfport, Miss.
Edward M. Adams, Monroe Co., Paris, Mo.
Geo. H. Kastendiek, Greene Co., Springfield, Mo.
Albertus P. Campbell, Cass Co., Plattsmouth, Nebr.
Joseph J. Tehan, Cayuga Co., Auburn, N. Y.
J. Lynn Gibbs, Schuyler Co., Watkins Glen, N. Y.
Deane B. Spalding, Cass Co., Fargo, N. D.
John E. Leaders, Defiance Co., Defiance, Ohio.
Seth Schlotterbeck, Preble Co., Eaton, Ohio.
Paul Strong, Hardin Co., Kenton, Ohio.
Walter W. Johnson, Marion Co., Marion, Ohio.
H. H. Edwards, Alfalfa Co., Cherokee, Okla.
H. J. Hays, Custer Co., Clinton, Okla.
T. F. Allen, Jefferson Co., Ringling, Okla.
C. M. Tuten, Hampton Co., Hampton, S. C.
John T. Faulkner, McCormick Co., McCormick, S. C.
C. H. Sinclair, Beadle Co., Huron, S. D.
Kenneth Lord, Davison Co., Mitchell, S. D.
Joe M. Brakebill, Monroe Co., Madisonville, Tenn.
Robert F. Parker, Franklin Co., Winchester, Tenn.
Dudley Davis, Shelby Co., Center, Tex.
E. J. Foster, Webb Co., Laredo, Tex.
William Robb, Carbon Co., Price, Utah.
Clarke LeBarre, Skamania Co., Stevenson, Wash.

NEW CATALOGS

Care and Lubrication of Ball and Roller Bearings

The LUBRIPLATE DIVISION of Fiske Brothers Refining Co., 129 Lockwood Street, Newark, N. J., has just released for distribution Bulletin No. 1-43, in which is set forth much valuable information relating to the installation, care and lubrication of ball and roller bearings. Operating and Maintenance Engineers interested in securing best possible operating performance and long life of anti-friction bearings should write for free copy of this important bulletin.

Catalog of Selected Technical Books

International Textbook Co.
Scranton, Pa.

This new catalog lists many authentic and easily understandable textbooks on aeronautics, accounting, blueprint reading, chemistry, bridge design, concrete engineering, highway engineering, hydraulics, sanitary engineering, mechanical engineering, etc. They offer basic instruction as well as advanced

(Continued on page 66)

As more materials are diverted to essential war uses, new equipment becomes more difficult to get. Greater care must be given present equipment until after Victory. Let your Gorman-Rupp distributor restore your equipment to its original operating efficiency. They carry parts and repairs for all equipment they sell. Their charges will be reasonable.

Gorman-Rupp Self-Priming Centrifugal Pumps are available for immediate delivery through Gorman-Rupp Distributors.

THE GORMAN-RUPP CO. Mansfield, Ohio

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SNO-PLOWS
REG. U.S. PAT. OFF.

There is a FRINK Sno-Plow for every need, equipped with every modern device for quick, clean plowing. Get your copy of our catalog *today*.

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DAVENPORT-BESLER CORP., DAVENPORT, IOWA
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Construction Materials and Equipment

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1. New 8 page booklet pictures and describes a corrugated pipe shelter with gas tight end walls, emergency escape tunnel and other desirable features. Armco Drainage Products Assn., Middletown, Ohio.

Bridges

7. Teco Connectors, a new method of structural engineering, to spread the load on a timber joint more equally over the cross-section of the wood is described in new literature available from Timber Engineering Co., Dept. BS-2, 1319—18th St., N. W., Washington, D. C.

Cement Dispersion

9. "Economics of Cement Dispersion and Pozzolith" tells the complete story of how cement dispersion reduces water required up to 20% and increases workability 150%. Write The Master Builders Co., Cleveland, Ohio, for a copy.

10. A valuable treatise on available means of securing high strength, prevention of sealing, increased durability and improved wear resistance in concrete pavement construction. Master Builders Co., 7016 Euclid Ave., Cleveland, Ohio.

Cement, Early Strength

11. 64-page manual tells how to speed up year 'round concreting, shows how to secure high early strength and greater workability at temperatures either below or above freezing. Contains many actual examples of practical concreting operations; well illustrated with more than 60 photos, charts, graphs and tables. Calcium Chloride Assn., Penobscot Building, Detroit, Mich.

Cold Mix Plants

15. New catalog and prices of Portable Bituminous Mixers in 6 to 14 ft. sizes for resurfacing and maintenance. Issued by The Jaeger Machine Co., 400 Dublin Ave., Columbus, Ohio.

Cold or Wet Weather Construction

18. Cleaver Aggregate Heaters and Dryers, Hot Water Boosters, and Automatic Steam plants are designed to speed up cold or wet weather construction. Write for illustrated bulletins. Cleaver-Brooks Co., 3112 W. Center St., Milwaukee, Wis.

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31. New 48-page booklet in five sections explains clearly the effects, advantages and methods of using Calcium Chloride and Portland Cement mixes. Complete and packed with practical information; well illustrated; pocket size. Sent free on request by Solvay Sales Corp., 40 Rector St., New York, N. Y.

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32. Tru-Cure, a newly developed compound for curing concrete is a clear liquid that is sprayed on wet concrete immediately after finishing. Saves several hours to a day's time usually lost on the average concrete job. Write for literature and full details. Truscon Laboratories, Detroit, Mich.

33. 64-page manual of concrete curing with calcium chloride. Complete, handy. Contains useful tables, well illustrated. Write the Columbia Chemical Division, Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, Pa.

Concrete

36. "Cutting Concrete Costs"—Booklet analyzes costs and outlines methods of figuring the lowest cost schedule. Notes on job planning. For copy, write Lone Star Cement Corp., 342 Madison Ave., New York, N. Y.

Concrete Mixers

44. Catalog and prices of Concrete Mixers, both Tilting and Non-Tilt types, from 3½S to 56S sizes. The Jaeger Machine Company, 400 Dublin Ave., Columbus, Ohio.

Drainage Products

70. Standard corrugated pipe, perforated pipe and MULTI PLATE pipe and arches — for culverts, sewers, subdrains, cattlepasses and other uses are described in a 48-page catalog entitled "ARMCO Drainage Products," issued by the Armco Drainage Products Association, Middletown, Ohio, and its associated member companies. Ask for Catalog No. 12.

Drainage

71. Walker Poroswall Rapid Drain Pipe for Drainage or Water Collection is claimed to be the fastest drainage medium known. Send for latest literature explaining its many uses. Walker Cement Products Co., Little Ferry, N. J.

73. "Principles of Design of Airport Drainage" and other articles on airport drainage reprinted from PUBLIC WORKS Magazine are being distributed free by Bowerston Shale Co., Bowerston, O., Hancock Brick & Tile Co., Findlay, O., and Columbus Clay Mfg. Co., Blacklick, O. Address anyone of the above for a copy.

Graders, Patrol

105. The Austin-Western 99M Power Grader with its powerful all wheel drive simplifies all construction and maintenance; handles difficult jobs with economy and efficiency; and does better work on grading, ditching, scarifying, snow plowing, loading, mixing, bulldozing, shoulder trenching and backsloping. Write for Bulletin 1946. Austin-Western Road Machinery Co., Aurora, Ill.

Mixing Plants, Asphalt

106. The Cleaver Asphalt Mixing Plant for an inexpensive plant mix and the Cleaver Tank Car Heater and Bituminous Booster are covered in illustrated catalogs sent on request by Cleaver-Brooks Co., 3112 W. Center St., Milwaukee, Wis.

Mud-Jack Method

107. How the Mud Jack Method for raising concrete curb, gutter, walls and street solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities — a new bulletin by Koehring Company, 3026 West Concordia Ave., Milwaukee, Wis.

Oil

109. Ring-Free Motor Oil that keeps motors clean and free from carbon, and reduces frequency of overhauls is described in literature available from Macmillan Petroleum Corp., 530 West 6th St., Los Angeles, Calif.

Paving Materials, Bituminous

111. New "Tarvia Manual" is packed with useful data on how to build and maintain roads with Tarvia. Each step is illustrated with excellent action pictures, 64 pp. 103 ills. Write to The Barrett Div., 40 Rector St., New York, N. Y.

Pumps

120. Interesting new booklet tells how to lengthen the life of your pumps. Explains how a little care will save a lot of wear. Write today for your copy. Homelite Corp., 2403 Riverdale Ave., Portchester, N. Y.

121. New illustrated catalog and prices of Jaeger Sure Prime Pumps, 2" to 10" sizes, 7000 to 220,000 G.P.H. capacities, also Jetting, Caisson, Road Pumps, recently issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus, Ohio.

123. New brochure by Gorman-Rupp Co., Mansfield, Ohio, illustrates and describes many of the pumps in their complete line. Covers heavy duty and standard duty self-priming centrifugals, jetting pumps, well point pumps, triplex road pumps and the lightweight pumps.

124. 16-page illustrated bulletin, SP-37, describes and illustrates complete C. H. & E. line of self-priming centrifugal pumps from ½" to 8", including lightweight models for easy portability. C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee, Wis.

Road Building and Maintenance

128. Motor Patrol Graders for road maintenance, road widening and road building, a complete line offering choice of weight, power, final drive and special equipment to exactly fit the job. Action pictures and full details are in catalogs Nos. 253, 254 & 255, issued by Gallon Iron Works & Mfg. Co., Gallon, Ohio.

Rock Drill Maintenance

130. New booklet presents through amusing cartoons useful hints on proper rock drill maintenance methods—what your men can do to get more work out of your tools with a minimum of expense for repairs and compressed air. Write The Cleveland Rock Drill Co., 3734 East 78th St., Cleveland, Ohio.

Rollers

133. New Tu-Ton roller of simple construction for use in rolling sidewalks along highways, playgrounds and other types of light rolling is fully described in a bulletin issued by C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee, Wis.

138. "The Buffalo-Springfield line of road rollers (tandem, 3-wheel, and 3-axle) are described in the latest catalog issued by the Buffalo-Springfield Roller Co., Springfield, Ohio."

139. "Ironeroller" 3 Axle Roller for extra smooth surfaces on all bituminous work. Booklet contains roller data and operation details. Hercules Co., Marion, Ohio

140. This well-illustrated 16-page catalog describes the tandem, autocrat, cadet, and roll-a-plane rollers, and explains what each is intended to accomplish. Write Austin-Western Road Mach. Co., Aurora, Ill.

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Soil Stabilization

150. "High-Service, Low Cost Roads" is one of the newer booklets using an effective combination of picture and text to set forth the principles and advantages of road surface stabilization with calcium chloride. Complete, interesting and well illustrated. 34 pages. Sent by Solvay Sales Corp., 40 Rector St., New York, N. Y.

152. The Columbia Chemical Division will be glad to furnish to anyone interested complete information dealing with Calcium Chloride Stabilized Roads. This literature contains many charts, tables and useful information and can be obtained by writing Columbia Chemical Div., Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, Pa.

154. "Soil Stabilization with Tarvia"—An illustrated booklet describing The steps in the stabilization of roadway soil with Tarvia will be mailed on request by The Barrett Div., 40 Rector St., New York, N. Y.

Spreader

187. Jaeger Paving equipment, including Mix-in-Place Roadbuilders, Bituminous Pavers, Concrete Bituminous Finishers, Adjustable Spreaders, Forms, etc.—4 complete catalogs of latest equipment in one cover, issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus, Ohio.

Surface Consolidation and Maintenance

188. Detailed and illustrated presentation of the method and procedure in consolidated operations; explains how sub-soils can be conditioned to resist softening and frost action; how surfacing can be consolidated to provide smooth all-weather riding surfaces; how they can be maintained so as to prevent disintegration and gravel loss. Write the Calcium Chloride Association, Penobscot Bldg., Detroit, Mich., for Bulletin No. 29.

Timber Structures

189. "Typical Designs of Timber Structures" contains plans for 45 representative structures that have been engineered with Teco Connectors. For free copy write Timber Engineering Co., Inc., Room 6GG, 1319—18th St., N. W., Washington, D. C.

Wellpoints

195. New complete catalog, "Griffin Pointed Wellpoint Facts," just issued. Covers pre-drainage, describing wellpoints, jetting pumps, with tables, diagrams, and illustrations. Griffin Wellpoint Corp., 881 E. 141st St., New York.

Street and Paving Maintenance

290. "Blacktop Road Maintenance and Construction Equipment"—Asphalt and tar kettles, flue type kettles, spray attachments with completely submerged pumps, tool heaters, surface heaters, road brooms, portable trail-o-rollers, etc. Tnese are all described in detail and illustrated. This modern and up-to-date equipment for blacktop airport and road construction and maintenance is based upon experience and engineering research over a period of 42 years. Write for Catalog R. Littleford Bros., Inc., 452 East Pearl St., Cincinnati, O.

Snow Fighting

Snow Plows

350. "Frink One-Way Sno-Plows" is a four page catalog illustrating and describing 5 models of One-Way Blade Type Sno-Plows for motor trucks from 1½ up to 8 tons capacity. Interchangeable with V Sno-Plow. Features, specifications and method of attaching. Carl H. Frink, Mfr., Clayton, 1000 Islands, N. Y.

Ice Control

351. "Make Icy Highways Safe for Traffic"—a new bulletin by Michigan Alkali Div., Wyandotte Chemicals Corp., Wyandotte, Mich., tells how to use calcium chloride for modern ice control.

Sanitary Engineering

Aero-Filter

356. "Results Produced by Aero-Filters" is a new pamphlet covering results at Temple, Texas; Paris, Ill.; Webster City, Iowa; and Mason, Mich. Write Lakeside Engineering Corp., 222 West Adams St., Chicago, Ill.

Air Release Valves

357. Automatic Air Release Valves for water, sewage and industrial uses are described and illustrated in new catalog issued by Simplex Valve & Meter Co., 6750 Upland St., Philadelphia, Pa.

Analysis of Water

360. "Methods of Analyzing Water for Municipal and Industrial Use" is an excellent 94 page booklet with many useful tables and formulas. Sent on request by Solvay Sales Corp., 40 Rector St., New York, N. Y.

Activation and Aeration

376. A valuable booklet on porous diffuser plates and tubes for sewage treatment plants. Covers permeability, porosity, pore size and pressure loss data, with curves. Also information on installations, with sketches and pictures, specifications, methods of cleaning and studies in permeability. 20 pp. illustrated. Sent on request to Norton Company, Worcester, Mass.

Blowers

379. All interested in low cost air for sewage disposal will want a copy of this catalog describing operating principles and specifications of Roots-Connersville Aerating Blowers. Write to Roots-Connersville Blower Corp., 301 Valley Ave., Connersville, Ind.

Chlorinators, Portable

380. Complete data on new portable chlorinator designed to meet emergency calls quickly and efficiently. Write Wallace & Tiernan Co., Inc., Newark, N. J.

381. "Emergency Sterilization Equipment," a new bulletin describing the advantages of Dual Drive Chlor-O-Feeders which can serve as either a permanent chemical feeder or as a portable emergency chlorinator. Order from Proportioneers, Inc., 96 Codding St., Providence, R. I.

Cleaning Sewers With Own Forces

383. A 20-page booklet describes and illustrates a full line of sewer cleaning equipment—Rods, Root Cutters, Buckets, Nozzles and Flushers. Write W. H. Stewart (Pioneer Mfr. since 1901), Jacksonville, Fla., or P. O. Box 767, Syracuse, N. Y.

384. 32-page illustrated booklet explains how a city can clean its sewers and culverts with its own forces using the up-to-date Flexible Sewer Rod equipment. Illustrates and describes all necessary equipment. Issued by Flexible Sewer Rod Equipment Co., 9059 Venice Boul., Los Angeles, Calif.

Consulting Engineers

385. "Who, What, Why" outlines briefly the functions of the consulting chemist and chemical engineer. Covers various methods of cooperation, on different types of problems, with industry, with attorneys and with individuals. Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y., will send a copy on request.

Feeders, Chlorine, Amonia and Chemical

387. For chlorinating water supplies, sewage plants, swimming pools and feeding practically any chemical used in sanitation treatment of water and sewage. Flow of water controls dosage of chemical; reagent feed is immediately adjustable. Starts and stops automatically. Literature from % Proportioneers, Inc. % 96 Codding St., Providence, R. I.

Filters

388. How to increase the capacity of filters through use of Anthrafilt and complete data on use of Anthrafilt for filters and sludge beds is contained in a revised pocket Manual issued by Anthracite Equipment Corp. For free copy write H. G. Turner, State College, Pa.

Fire Hydrants

390. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M & H Valve & Fittings Co., Anniston, Ala.

391. See listing No. 410.

Flow Meters

392. The primary devices for flow measurement—the orifice, the pilot tube, the venturi meter and others—and the application to them of the Simplex meter are described in a useful 24-page booklet (42A). Simplex Valve and Meter Co., 6750 Upland St., Philadelphia, Pa.

Gas Holders and Digesters

393. Clarifiers, sludge digesters and other tanks and gas holders for sludge gas. Graver Tank & Mfg. Co., Inc., 332 So. Michigan Ave., Chicago, Ill.

Gates, Valves, Hydrants

394. Gate, flap and check valves; floor stands and fittings. New catalog No. 24 gives detail information with dimensions for all types of new full line. M. & H. Valve & Fittings Co., Anniston, Ala.

395. Complete booklet with much worthwhile water works data describes fully Ludlow hydrants and valves. Sent on request. Ludlow Valve Mfg. Co., Troy, N. Y.

396. See listing No. 410.

Gauges

398. The full line of Simplex gauges for filtration plants are illustrated and described in catalog issued by Simplex Valve and Meter Co., 6750 Upland St., Philadelphia, Pa.

Laboratory Equipment

403. pH and Chlorine Control. A discussion of pH control and description of comparators, chlorimeters and similar devices. An 80-page booklet. W. A. Taylor & Co., 7301 York Road, Baltimore, Md.

Maintenance

404. "The Lubriplate Way" contains much valuable information on long-lasting Lubriplate lubricants which are especially adapted for difficult conditions such as parts that are immersed in sewage, water or steam. Write Lubriplate Division of Fiske Brothers Refining Co., 129 Lockwood St., Newark, N. J.

Manhole Covers and Inlets

405. Street, sewer and water castings in various styles, sizes and weights. Manhole covers, water meter covers, adjustable curb inlets, gutter crossing plates, valve and lamphole covers, ventilators, etc. Described in catalog issued by South Bend Foundry Co., Lafayette Boul. and Indiana Ave., South Bend, Ind.

Meters, Venturi

406. New bulletin illustrates Builders Air Relay system of transmission for the Venturi Meter which is particularly useful for liquids containing suspended solids like sewage. Eliminates corroson, clogged pipes, etc. Write Builders-Providence, Inc., Codding St., Providence, R. I.

Pipe, Cast Iron

408. Handbook of Universal Cast Iron Pipe and Fittings, pocket size, 104 pages, illustrated, including 14 pages of useful reference tables and data. Sent by The Central Foundry Co., 386 Fourth Ave., New York, N. Y.

409. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLavaud centrifugally-cast and pit-cast pipe. Bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Burlington, N. J.

410. "Cast Iron Pipe and Fittings" is a well illustrated 44 page catalog giving full specifications for their complete line of Sand Spun Centrifugal Pipe, Fire Hydrants, Gate Valves, Special Castings, etc. Will be sent promptly by R. D. Wood Co., 400 Chestnut St., Philadelphia, Pa.

Pipe, Lock Joint

412. Lock Joint Reinforced Concrete Sewer Pipe. Pressure Pipe, Culvert Pipe, Centrifugal Pipe and Subaqueous Pipe is described and illustrated in bulletins available from Lock Joint Pipe Co., Ampere, N. J.

Pipe, Transite

414. Two new illustrated booklets, "Transite Pressure Pipe" and "Transite Sewer Pipe" deal with methods of cutting costs of installation and maintenance of pipe lines and summarize advantages resulting from use of Transite pipes. Sent promptly by Johns-Manville Corp., 22 East 40th St., New York, N. Y.

Pipe, 2-inch Cast Iron

417. Generously illustrated booklet describes McWane 2-inch cast iron pipe and its manufacture in streamlined pipe shop. Write McWane Cast Iron Pipe Co., Birmingham, Ala.

Pipe Joint Compounds

418. The uses of Tegul-Mineralead for bell and spigot pipe and G-K Sewer joint compound are described in a 16-page illustrated booklet issued by Atlas Mineral Products Co., Mertztown, Pa. Includes useful tables for estimating quantities needed.

Pumps and Well Water Systems

420. Installation views and sectional scenes on Layne Vertical Centrifugal and Vertical Turbine Pumps fully illustrated and including useful engineering data section. Layne Shutter Screens for Gravel Wall Wells. Write for descriptive booklets. Advertising Dept., Layne & Bowler, Inc., Box 186, Hollywood Station, Memphis, Tenn.

Meter Setting and Testing

430. The most complete catalog we have seen on setting and testing equipment for water meters—exquisitely printed and illustrated 48-page booklet you should have a copy of. Ask Ford Meter Box Co., Wabash, Ind.

Screens

434. Be assured of uninterrupted, constant automatic removal of screenings. Folder 1587 tells how. Gives some of the outstanding advantages of "Straightline Bar Screens" (Vertical and Inclined types). Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill.

Sludge Drying and Incineration

440. "Disposal of Municipal Refuse." Complete specifications and description including suggested form of proposal; form of guarantees; statements and approval sheet for comparing bids with diagramatic outline of various plant designs. 48 pages. Address: Morse Boulger Destructor Co., 216-P East 45th St., New York, N. Y.

442. Recuperator tubes made from Silicon Carbide and "Fireclay" Corebusters for maximum efficiency are described and illustrated in bulletin No. 11 issued by Fitch Recuperator Co., Plainfield National Bank Bldg., Plainfield, N. J.

443. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Nichols Engineering and Research Corp., 60 Wall Tower, New York, N. Y.

Softening

444. This folder explains the process of Zeolite water softening and describes and illustrates the full line of equipment for that purpose made by the Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago, Ill. Write for a copy of this instructive folder.

Sprinkling Filters

445. Design data on sprinkling filters of Separate Nozzle Field and Common Nozzle Field design as well as complete data on single and twin dosing tanks, and the various siphons used in them, for apportioning sewage to nozzles. Many time-saving charts and tables. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago, Ill.

Swimming Pools

446. Data and complete information on swimming pool filters and recirculation plants; also on water filters and filtration equipment. For data prices, plans, etc., write Roberts Filter Mfg. Co., 640 Columbia Ave., Darby, Pa.

Taste and Odor Control

449. "Taste and Odor Control in Water Purification" is an excellent 92-page, illustrated booklet covering sources of taste and odor pollution in water supplies and outlining the various methods of treatment now in use. Every water works department should have a copy. Write Industrial Chemical Sales Div., 230 Park Ave., New York, N. Y.

450. Technical pub. No. 207 issued by Wallace & Tiernan Co., Inc., Newark, N. J., describes in detail taste and odor control of water with BREAK-POINT Chlorination, a method of discovering the point at which many causes of taste may be removed by chlorination with little or no increase in residual chlorine. Sent free to any operator requesting it.

Treatment

453. "Safe Sanitation for a Nation," an interesting booklet containing thumbnail descriptions of the different pieces of P.F.T. equipment for sewage treatment. Includes photos of various installations and complete list of literature available from this company. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago, Ill.

454. A full line of equipment for sewage disposal including clarifiers, chemical treatment plants, rotary distributors, gas holders and many other pieces of equipment are described in a new bulletin just issued by Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago, Ill.

455. New booklet (No. 1642 on Link-Belt Circuline Collectors for Settling Tanks contains excellent pictures; drawings of installations, sanitary engineering data and design details. Link-Belt Company, 2045 W. Hunting Park Ave., Philadelphia.

456. New 16-page illustrated catalog No. 1742 on Straightline Collectors for the efficient, continuous removal of sludge from rectangular tanks at sewerage and water plants. Contains layout drawings, installation pictures, and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia, Pa.

457. New illustrated folder (1942) on Straightline apparatus for the removal and washing of grit and detritus from rectangular grit chambers. Address: Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

458. "Sedimentation with Dorr Clarifiers" is a complete 36-page illustrated catalog with useful design data. Ask The Dorr Company, 570 Lexington Ave., New York, N. Y.

459. A combination mechanical clarifier and mechanical digester, The Dorr Clarigester, is explained and illustrated in a bulletin issued by The Dorr Company, 570 Lexington Ave., New York, N. Y.

461. Prefloccula'ion without chemicals with the Dorrco Clarifloculator in a single structure is the subject of a new booklet issued by The Dorr Company, 570 Lexington Ave., New York, N. Y.

462. Dorrco Monorake for existing rectangular sedimentation tanks, open or closed, is described and illustrated in a new catalog sent on request. The Dorr Co., 570 Lexington Ave., New York, N. Y.

465. Grit Washers and Collectors, by Jeffrey are built in three types: scraper, V-bucket and combination. For full details ask for Jeffrey Catalog No. 703-A. Jeffrey Mfg. Co., 948-99 No. Fourth St., Columbus, Ohio.

466. Flocculation with Floctrols. For details on controlled flocculation, tapered mixing, practical elimination of short circuiting, rapid settling of properly flocculated solds write for Catalog No. 703-A. Jeffrey Mfg. Co., 948-99 No. Fourth St., Columbus, Ohio.

Underdrains, Trickling Filter

468. Illustrated bulletin describes the Natco Unifilter block of glazed, hard burned clay for underdraining filter beds. Write National Fireproofing Corp., Pittsburgh, Pa., for free copy.

Valves (See Gates, Air Release, etc.)

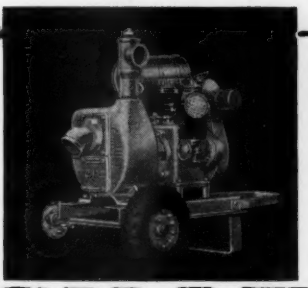
Water Treatment

470. If you have a water conditioning problem of any kind, write Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago, Ill., who manufacture all types of conditioning equipment and will be pleased to make recommendations.

472. Bulletin describes stabilizing lime-softened water by recarbonation, discussing gas production, washing, compressing, drying, and applying the CO(2). Infilco, Inc., 325 West 25th Place, Chicago, Ill.

Water Service Devices

500. Data on anti-freeze outdoor drinking fountains, hydrants, street washers, etc., will be sent promptly on request to Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati, Ohio.



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NEW CATALOGS

(Continued from page 62)

technical information. "Training for Victory" is the title of this new book catalog. Write for a free copy.

An 80-Page Book on Conservation of Construction Equipment and Facilities

This is designed for use by key men directly responsible for the operation and maintenance of equipment and critical materials.

Opening chapter of the book is entitled Plant Layout and presents suggestions for laying out a construction project so as to conserve manpower and economize in the use of critical materials. Construction Equipment is the title of the second section which presents basic principles governing use, care and repair of equipment.

Final chapter of the book is devoted to salvage and reclamation, which, the manual points out, should be a continuous activity to be vigorously pursued.

Copies may be secured from the Construction Foundation, Munsey Building, Washington, D. C., at 50 cents each, $5.00 per dozen and $25.00 per hundred.

Asphalt Institute Issues Emergency Revisions of its Construction Specifications

To conform with Recommendation No. 61 of the Petroleum Coordinator for War, as approved by the War Production Board, limiting the number of asphalt grades, The Asphalt Institute has made the necessary changes in its various construction specifications and issued them in pamphlet form with the title, "Construction Series No. 67—Emergency Revisions of The Asphalt Institute Construction Specifications."

Copies are available, without charge, upon request to The Asphalt Institute, 801 Second Avenue, New York, N. Y.

A.S.T.M. Standards on Cement

The sixth edition of this compilation issued annually by the American Society for Testing Materials gives in compact form all of the latest standard and tentative specifications, methods of chemical analysis, and methods of physical tests pertaining to cement. Also included is information on analytical balances and weights, and the Emergency Alternate Specifications for Portland Cement (EA—C 150) issued in the interest of expediting procurement. Included for the first time are the Tentative Specifications for Treated Portland Cement for Concrete Pavements (C 175-42 T). A Manual of Cement Testing and a List of Selected References for Portland Cement are also given.

This 125-page publication in heavy paper binding can be obtained from the A.S.T.M. Headquarters, 260 South Broad St., Philadelphia, Pa., at $1.35 per copy; on orders from 10 to 49 copies a price of $1.10 applies.

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